PROSTREAM® 1000

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Software Guide

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<Ctrl>, <Ctrl>+<Shift>	A key or key sequence to press.
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Bold	Indicates a button to click, or a menu item to select.
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Emphasis	The *italics* text used for emphasis and document references.

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Chapter 1
Features and Specifications

Introduction

Harmonic ProStream 1000 is a highly integrated MPEG/DVB multiplexer, scrambler and descrambler for multimedia services carried over digital broadcast networks. It features a modular, high-density chassis that is furnished with up to 5 Input/Output Modules (IOMs) and up to 4 Internal Processing Cards (IPCs) in a single one-rack-unit (1-RU) chassis. The modular platform design enables easy field replacement of cards, as well as field upgrades of SW and HW features.

This guide provides configuration and monitoring instructions for ProStream 1000.

Main Features

The following table lists the main features of ProStream 1000. The functionality of ProStream 1000 depends on the installed IPC. ProStream 1000 functions as an encoder or transcoder according to the installed IPC type.

Table 1–1: Main Firmware Related Features

Category	Feature	Description
Input and Output Interfaces	IP IOM	■ Two independent ports per IP IOM ■ line rate of 1 Gbps per IP IOM ■ Maximum input and output bitrate is 500Mbps per IP IOM
	ASI SCR IOM	ASI-SCR - up to four ports per IOM ■ Inputs and outputs DVB-ASI streams ■ Supports Common Scrambling Algorithm scrambling ■ Supports synchronizing the device to an external clock coming from a GPS receiver ■ Bitrate: ❑ Maximum output bitrate of 187 Mbps ❑ Maximum input bitrate of 210 Mbps ■ Supports packet size: 188 or 204 bytes
Parsing Tables	Dynamic parsing of input	Extracts incoming feeds and displays their structure and elements on the control interface. It displays their bitrate, CC errors, SI PSI structure etc'.
Redundancy	Input	■ GbE port redundancy ■ Socket redundancy for each input socket ■ Service redundancy

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Table 1–1: Main Firmware Related Features

Category	Feature	Description
Processing	Multiplexing/ provisioning options of the device	■ Maximum processing bitrate of 400 Mbps ■ Full multiplexing (any input to any output) ■ Multicast of any input stream to multiple transport streams. ■ Multicast of services with different transcoding configuration ■ IP multicast - supports IGMP ver 2/3 ■ Passing range of PIDs from any input to any output
	DiviTrack over IP	Statistical multiplexing - combines rate shaping using external encoders
	DiviTrackMX (HW dependent, type of IPC)	Statistical multiplexing - combines rate shaping using internal encoders
	ReEncoding (HW dependent, type of IPC)	When re-encoding modules are mounted: Re-encodes incoming MPEG programs and outputs them with high video quality as follows: ■ CBR - user-configurable constant bitrate ■ DivTrackMX VBR - outputs pools of high quality, VBR HD/SD re-encoded programs. It increases bandwidth efficiency
	Transcoding (HW dependent, type of IPC)	When transcoding modules are mounted: Transcodes incoming H264/MPEG2 programs and outputs them as H264/MPEG2 CBR/VBR services.
	SFN-over-IP	MPEG-over-IP transport in DVB-T / DVB-H networks that operate in SFN mode. This includes ability to synchronize to an external GPS clock and external MIP inserter.
	Scrambling	■ Supports the following scrambling algorithm: ❑ DVB-CSA ❑ AES-NSA2 ❑ AES Fixed Key Control Word (CW) scrambling of outgoing TS over IP ❑ BISS ❑ Selective Encryption ■ Functions as scrambler and in AES-CBC scrambling mode, also as de-scrambler ■ Supports PSIG MUX protocol ■ Supports ECMG redundancy ■ Internal EIS

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Table 1–1: Main Firmware Related Features

Category	Feature	Description
Output BitRate	Transcoding BitRate	Video ■ VBR - in a pool ■ CBR - For HD up to 3 services per pool for best performances. Audio ■ CBR only
Output Monitoring	TS Mirroring	TS Mirroring - Duplicates each output TS (master) from any interface (IP, ASI) to any other TS (slave) in any interface. Supports all master functions such as: rate shaping, scrambling, RSS, tables generation, common, PID range, DToIP. IP Mirroring - Allows to duplicate all output data from one port (GbE1) of an IP IOM card to the other port (GbE2) of that card.
Output Capabilities	SCT35 Insertion	Receives an SNMP trap from SL 10 and generates an SCT35 cue message
	Table Generation	■ Create CAT ■ Create SDT ■ Create NIT
	Table Re-generation	■ PSIP re-generation ■ EIT re-generation
	PID Prioritization	In case of Over subscription, the ProStream 1000 starts dropping PIDs according to their priority.
	PID Range	Allows to pass a range of PIDs from any input to any output. Up to 16 PID ranges per unit.
	Slate	Any service can be configured to have an alternative, or backup input feed or source that is enabled on the output upon disruption of the primary feed. It allows MSOs to inform their subscribers that they are doing anything possible to restore the service.
	Splicing	Allows cable headends and broadcast affiliates to insert locally-generated commercials and short programs into remotely distributed regional programs before they are delivered to home viewers
	Emergency Alert System (AES)	Enable MSO to automatically broadcast emergency alert messages through pre-configured channels.

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Table 1–1: Main Firmware Related Features

Category	Feature	Description
PCR	Input PCR	The PCR can arrive on any input PID, such as video, audio or not on ES
	Output PCR	■ The PCR can outflow on any PID. In transcoding, only over video PID ■ Generate PCR ■ Common PCR
Management	Management and monitoring interfaces	■ Control Panel ■ Web client ■ NMX (Harmonic's Digital Service Manager)

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Chapter 2
Logging into ProStream 1000

Overview

ProStream 1000 has two access levels. Each access level applies to all forms of communication with the device whether it is a Web client or a Telnet session. Each access level authorizes you to access different working modes of the device. The access level also serves as the username. The following table lists the access levels/usernames, working modes, and passwords.

Table 2-1: Device Access

Access Level/ Username	Working Mode	Password
Monitor	Allows the user only to monitor the operation of the device.	monitor
Configure	Allows the user to configure the device only via a Web client and to define the monitor access level password.	configure

The active access level/username appears in the upper right hand corner of the Web client.

Full Device Configuration

The ProStream 1000 Web Client provides access to full device configuration, monitoring alarms, and troubleshooting. This manual describes how to run these operations through a Web browser. The following table lists the Web client specifications.

Table 2–2: Web Client Specifications

Parameter	Explanation
Screen resolution	1280 x 1024
Supported Web browsers	Microsoft Internet Explorer Versions 7, 8 and 9

NOTE: After you open the browser, clear the cache of earlier GUI files. Select **Tools > Internet Options** and in **Browsing History**, click **Delete**.

TIP: Clear the cache after upgrading the firmware of a ProStream 1000 device.

Logging into the Device

To log in through a Web client:

1. In a web browser, enter the address of the required device.
2. Click **Login.**
3. Enter your username and password.

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4. To save the password for the future, select **Remember my password**.
5. Click **OK**.

The Web client page appears and you may start working with the device according to the permissions of your access level.

Changing a Password

When logging in for the first time, use the default passwords for usernames Configure and Monitor. You can then change your password.

To change a password:

1. Select **Tools** > **Password**.
2. In the Password dialog box do the following:
   - Type the current password from the **Current Password** field.
   - Type a new password in **New Password** field.
   - In **Verify Password**, retype the new password.
3. Click **Change Password**.

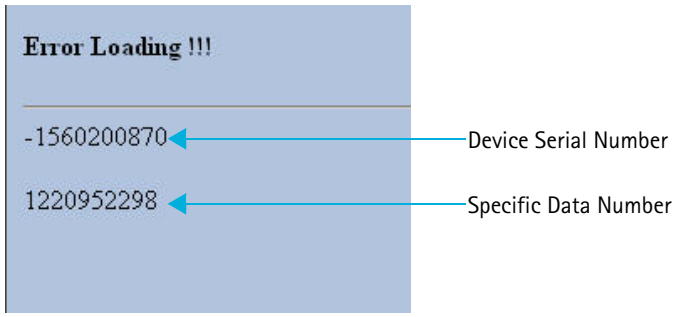
   After three unsuccessful login trials you can restore your password.

Restoring a Password

You have three attempts to log in to the device. If you forget your password, you can create a new one.

To create a new password:

1. Upon your failed attempt to log in, a screen appears with a Specific Data Number.



NOTE: A Specific Data Number is generated for each failed login.

2. Record the unique number and immediately contact Harmonic Technical Assistance Center and provide customer support with the Specific Data Number.

   Harmonic Technical Assistance Center personnel will provide you with a temporary password.
3. Open your browser, and type the following:

   http://<device IP address>/resetpass.htm
4. Click **Go**.

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5. The **Connect To <IP Address>** dialog appears:

6. In **Username**, type `backdoor`.
7. In **Password**, type the password you received from Harmonic Technical Assistance Center.
8. Once you have logged in to the device, set a user password for future logins.

   See *Changing a Password*.

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Chapter 3
Configuring and Provisioning

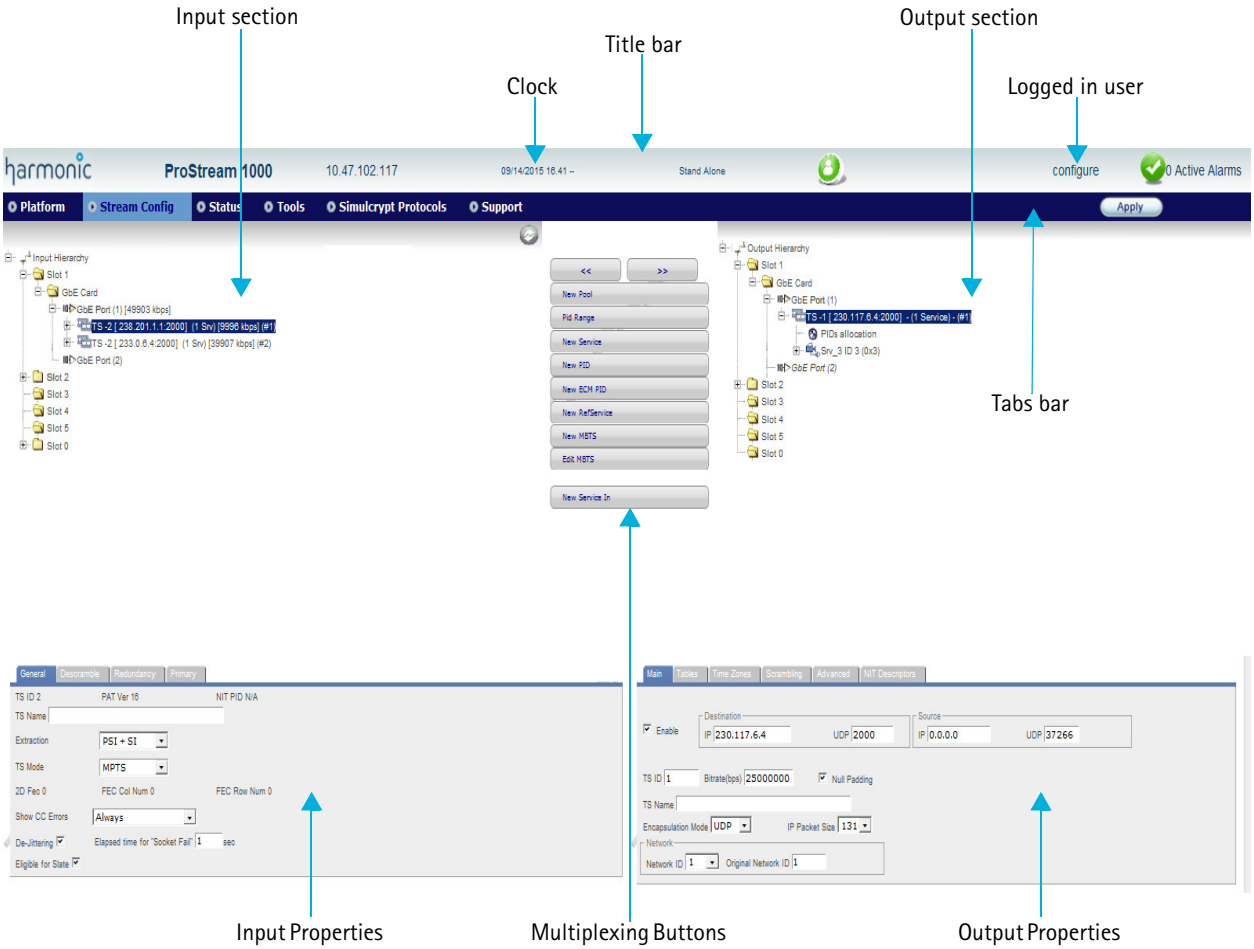
Overview

Once the ProStream 1000 is properly cabled and set up in your network, you can access it through the Web client in order to operate and troubleshoot it. The Web client reads data from the device and presents it in the User Interface (UI).

This chapter describes how to configure and multiplex a ProStream 1000 standalone model using the Web client.

NOTE: ProStream 1000 version 4.9 and up requires IE 7 and up.

Web Client Page



The Web client page includes the following sections:

- Title bar - Displays the ProStream model, its IP address, the current date and time, the logged in username and the alarm indicator.

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- Tabs bar- Links you to parameters required for ProStream configuration and provisioning. The available tabs are as follows:
  - Platform - Links you to the Platform page.
  - Stream Config - Links you to the Stream Config page.
  - Status - Links you to the Alarms page, the main monitoring page
  - Tools - Allows you to set device time and required protocols
  - Simulcrypt Protocols - Links you to the CAS pages to configure CAS parameters and to view ECM, SCG, and CWS parameters, among others
  - Support - Links you to diagnostic information about the device
  - Viewer - Allows you to set parameters such as Standalone or NMX control.
  - Log - Links you to the Log page where device status can be seen and reports created.

  The Tabs bar also includes the Apply button.
- Work area - Displays the parameters available for configuration and provisioning and enables configuring and provisioning of the ProStream. It is divided into two sections: Input and Output. The work area changes according to the tab you select.
- Buttons - Includes multiplexing buttons. See *Multiplexing Buttons*.

ProStream Monitoring

An alarm indicator is displayed in the title bar of each of the Web client pages. The Alarm indicator links to the Alarm page and provides the information described in the following table.

Table 3–1: Alarm Indicators

Alarm Indicator	Explanation
Green button	No active alarms.
Red button	There is at least one active alarm. Hover your mouse over the alarm button to display the alarm description. Click the Alarm button to open the Alarm page.
N Active Alarms	The number of registered alarms is displayed next to the Alarm button. Click the link to open the Alarm page.

Before You Begin

Before you start to configure and provision the device, pay attention to the following:

- Grayed-out fields are for viewing only.
- To change parameter values, click inside a field and type the required values. Clicking outside the field updates the web client interface and displays the new parameters. Note the following web page options:
  - Clicking **OK** saves the new configuration and closes the web page dialog box. The new configuration is not applied to the device.
  - Clicking **Save** saves the new configuration and keeps the web page dialog box open. The new configuration is not applied to the device.
  - Clicking **Apply** saves the new configuration and applies it to the device.
  - Clicking the **Close** box at the upper right corner of the browser closes the web page without saving the configuration.

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- To delete rows in a table, select the **Select** check box and then click **Delete/Remove**.

Stages of ProStream Configuration

Configuring the ProStream standalone model includes the following stages:

- **Platform and Card parameter configuration** - Assign the cards to specific slots and set the unit name. Usually, this configuration is a one-time procedure performed as soon as you start configuring the device. You can also view chassis and GbE port parameters and define various global device settings.
- **Input provisioning** - Configure ports, sockets and streams on the Stream Config page. Multiplexing also begins here. Input provisioning includes the following stages:
  - Physical Input configuration - Enable input ports and with GbE input ports, also setting port and socket parameters.
  - Logical input configuration - If defaults are not used, set the transport stream parameters. Multiplexing transport streams also falls under this stage.
- **Output provisioning** - Configure the output on the Stream Config page. Output provisioning includes the following stages:
  - Physical configuration - Includes GbE port and socket parameters.
  - Logical configuration - Set TSs, services and PIDs parameters, arranging the output content (multiplexing).
- **Scrambling/Descrambling** - When ProStream functions as a scrambler/descrambler, set communication parameters to allow communication between the device and the Conditional Access System (CAS). You can also view other CAS parameters such as SCG, ECM and EMM parameters.

  When ProStream functions as a descrambler using the AES protocol, set the CWS parameters.
- **Encoding** - When ProStream functions as a re-encoder, set the re-encoding parameters. Set these parameters via the Encoding tab.
- **SFN over IP** - When ProStream functions as a transmitter or receiver in a SFN over IP application, set the required parameters.

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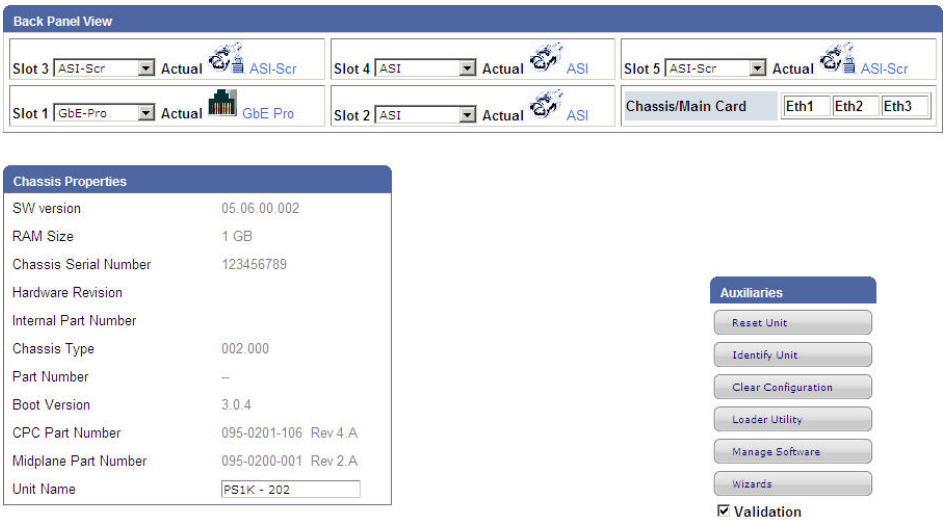
Platform and Card Parameters

Configuring platform parameters is usually a one-time procedure that you do through the Platform page. The Platform page is displayed when you link to the device.



The Platform page comprises a graphical view of the ProStream back panel and as you select each component, a table presenting its parameters appears. The table enables you to configure and view various parameters.

Setting ETH1-ETH3 Parameters

The IP address of the ETH3 port or ProStream primary IP address is configured as part of the ProStream installation (see ProStream Installation Guide). You can change the IP address settings.

To change an ETH1, ETH2, or ETH3 configuration:

1. In **Platform**, select the required Ethernet port.
2. In the table that appears, enter the required IP address, subnet mask and default gateway.
3. Click **Apply** to apply changes.
4. If you configured ETH3, log in to the new IP address.

NOTE: Configure the IP address of ETH3 on a different subnet than that of ETH2. Configuring both ports on the same subnet might result in serious network communication problems. ProStream uses ETH3 to communicate with the network for management purposes and ETH2 for Conditional Access Systems (CAS).

NOTE: The MAC address is the physical address of the unit. The address is retrieved and presented in the Platform page for viewing purposes only.

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Setting Chassis Parameters

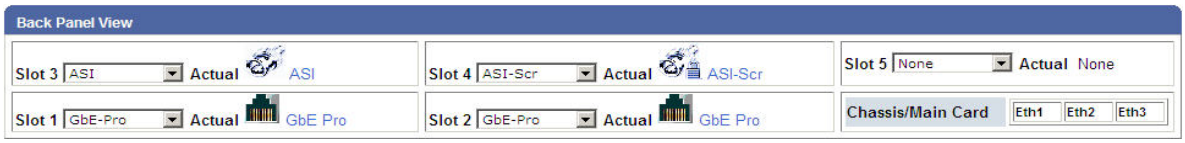
Table 3-2: Actual Card Icons

Icon of Actual Card	Explanation
	ASI IOM
	ASI SCR IOM with scrambling support.
	GbE Pro IOM GbE 4G
	8VSB card. See *8VSB Modulation*.

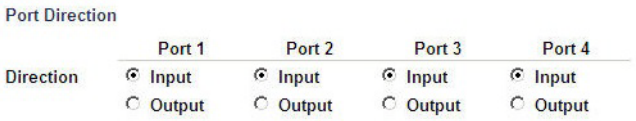
To set the chassis parameters:

1. Click the **Platform** tab.
2. Select **Chassis/Main Card**.
3. In the **Chassis Properties** table, enter the unit name.
4. Click **Apply**.

   You can also view the following information in **Chassis Properties:**
   - SW Version - Indicates the firmware version.
   - RAM Size - Indicates the RAM size of the device. In this case the chassis supports 1GB RAM.
   - Chassis Serial Number - Serial number of the chassis.
   - Hardware Revision - Revision of the Central Processing Card.
   - Internal Part Number - Indicates hardware configuration.
   - Chassis Type - Indicates chassis type.
   - Part Number - Custom slot.



5. If you select an ASI or ASI SCR IOM, Port Direction options appear.



6. Select the port direction for the corresponding port, as required.

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Global Platform Configuration

The **Auxiliaries** section enables you to apply a global platform configuration.

To identify a unit:

- In **Platform** under **Auxiliaries**, click **Identify Unit**.

  The Local LED on the ProStream front and back panel turns on and the button toggles to Stop Identify.

To reset the unit:

1. In **Platform** under **Auxiliaries**, click **Reset Unit**.
2. Confirm the action by clicking **OK**.
3. Wait until the procedure is complete.

To clear a configuration:

1. In **Platform** under **Auxiliaries,** click **Clear Configuration**.
2. Confirm the action by clicking **OK**.

   The previous configuration is removed and the device boots up with the default configuration.

To download the Loader utility:

1. In **Platform** under **Auxiliaries,** click **Loader Utility**.
2. Navigate to the location of your choice and click **Save**.

   The Loader utility is saved to the required location and you can start using it.

To manage software versions:

- In **Platform** under **Auxiliaries**, click **Manage Software**. For detailed information and instructions, see *Managing Software*.

To access a wizard:

- Click **Wizards** to open the **Wizards** page. See *Working with Wizards*.

Verifying that Validation is Active

By default, a validation system is active when using the Web client. The system checks the validity of newly entered values. It is strongly recommended to configure and provision the device with the **Validation** box selected.

Managing Software

The **Software Management** page enables you to do the following:

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- Transfer and install an updated version
- Change the running software - Up to two versions of the software package can reside on the ProStream device. Typically, the two packages include the currently installed version and the previously installed version. You can change the running software as required.

To transfer and install an updated firmware version:

1. From the Harmonic FTP site, download the zipped folder of the updated version.
2. Unzip the folder.
3. In **Platform**, in **Auxiliaries**, click **Manage Software**.
4. Click **Install Software Package**.

   The **Transfer Software** dialog box appears.
5. Click **Browse** and navigate to the location of the unzipped folder and select the file in the following format:xx.xx.xx.xxx (the file does not have an extension.)
6. Click **Transfer**.

   A message appears notifying you that the transfer takes a few minutes.
7. Click **OK**.

   The selected package is transferred and installed on the device. Progress bars and flashing messages appear indicating the stages and progress of the version transfer and installation.

CAUTION: During software transfer, leave the web browser open and do not reset the device. Either action can cause the device to hang without valid firmware for booting up.

   Once the transfer is complete, a message appears asking if you want the device to run with the newly transferred version.
8. Click **OK**.

   A message appears asking you if you want to reset.
9. Click **OK** to reset and run the device with the newly transferred version.

   A message appears asking if you want to close the Web client.
10. Click **Yes** to close the Web client page.

    This is the recommended option.

    If you click No, the Web client page stays open during reset, but it cannot read data from the device to display updated information.
11. Wait a few minutes until reset is complete and open the Web client page.

To organize the loaded software versions:

1. In **Platform**, click **Manage Software**.

   The **Software Management** dialog appears.
2. Open the **Software Version list** to select the required version.
3. Do either of the following:
   - To select a version to be installed after reset, click **Select**. A message appears notifying you that the selection completed successfully and asking if you want to reset the device. Once you click **OK**, the device reboots to run with the newly selected version.
   - To remove a version from the device, click **Remove**.

NOTE: You can have up to three software versions loaded on the device.

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Working with Wizards

The built-in wizards streamline the configuration of the following:

- Routing a large number of sockets
- In SFN application - Configuring the Transmitter and Receiver devices

To select and use a wizard:

1. In the Web client page, select **Platform**.
2. Under **Auxiliaries**, click **Wizards**.
3. Open the Wizards list and select either of the following:
   - SFN Receiver Configuration - For receiver configuration
   - SFN Transmitter Configuration - For transmitter configuration
   - SPTS Socket Routing Configuration - For routing input SPTS sockets to output SPTS sockets.

   The Description and Parameters sections are updated according to the selected wizard.
4. Enter the required parameters.
5. Click **Run** to process the configuration.

   This process may take a few seconds.
6. Click **Apply** to send the configuration to the device.
7. To return to the Platform page, click the **Platform** tab.

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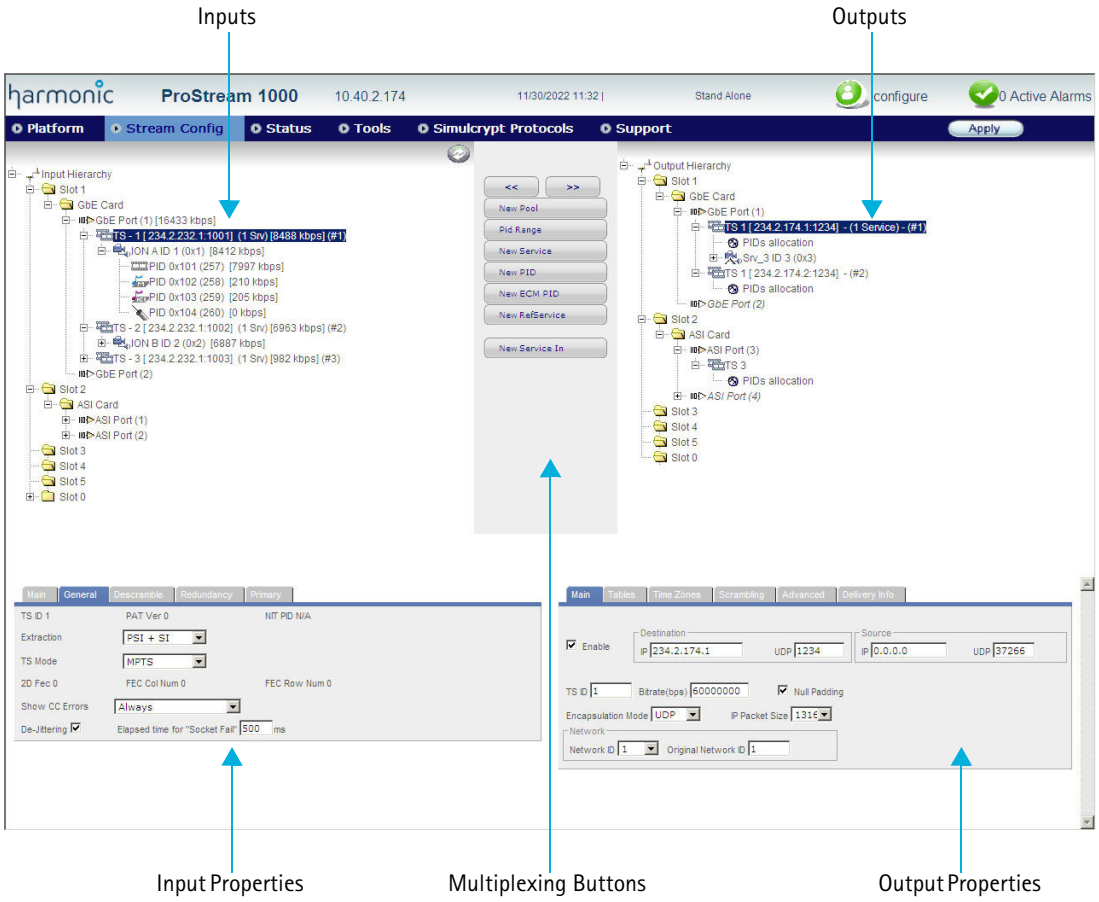
Stream Config page

The Stream Config page enables you to view the input and output ports and to configure them. The page reflects the cards mounted in the device ProStream and reads and displays data from the input ports. The following figure shows the Stream Config page:



The Stream Config page always includes the following sections:

- Input - Displays the current input ports and their inputs according to the card mounted.
- Input Properties - Use this to enable and configure a port. This section changes according to the item selected in the Input section.
- Output - Displays the available output ports and their provisioned output TSs.
- Output Properties - Use this to configure the output ports, TSs, services and PIDs.
- Multiplexing buttons

Table 3–3: Multiplexing Buttons

Button	Button Name	Selected Output Parameter
>>	Add to Output from input	Any except PID Allocation
<<	Remove from Output	Any except PID Allocation

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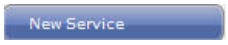
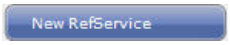
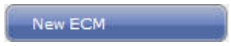
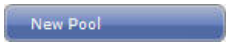
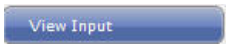
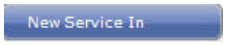
Table 3–3: Multiplexing Buttons

Button	Button Name	Selected Output Parameter
	New Service	Any except PID Allocation
	New PID	Any except PID Allocation
	PID Range - moves a PID range from the input to the output	Any except PID Allocation
	New Reference Service	Any except PID Allocation
	New ECM	PID Allocation
	New EMM	PID Allocation
	New ECM PID	Hierarchy, TS, audio/video PID
	New EMM	PID Allocation
	New Pool	Any except PID Allocation
	ReAlloc TransEngines - to optimize transcoding performance following the *Could not Allocate Transcoding Unit* alarm.	Hierarchy
	View Input - click to view input extraction of object selected in output.	Service and audio/video PID
	New Service In - click to create a service in the input. Toggles to Delete Service In when the service is selected in the input.	Select a TS in the *Input* section.

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Stream Config Page Conventions

The following table lists describes the icons used in the Stream Config page and the information displayed next to the icon.

Table 3–4: Stream Config Conventions

Icon	Explanation	Additional Information
	Arrowhead is yellow - active Port	
	Arrowhead is gray - inactive Port. The port type name is italicized. (ASI, GbE)	
	Transport Stream (TS)	TS ID and either of the following: ■ GbE - (IP:UDP) index # ■ ASI - (# of services)
	Descrambled Transport Stream (TS)	TS ID and either of the following: ■ GbE - (IP:UDP) index # ■ ASI - (# of services)
	TS Mirror	The current TS is mirroring another TS
	Pool	For future use. Pool ID and its bitrate
	Multiplexed ECM	PID number
	EMM PID	PID number
	Video PID	PID number
	Audio PID.	PID number
	Audio PID of type MPEG1L2, usually ES 0x3/4	PID number
	Audio PID of type AC3, usually ES 0x81	PID number
	SCTE35 PID	PID number
	Private Data PID, Ghost PID, or Range of PIDs	PID number
	PID allocation for ECMs and EMMs	
	PID	PID number
	Service, Reference Service	Service name and ID
	Re-encoded service	Service name and ID

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Table 3–4: Stream Config Conventions

Icon	Explanation	Additional Information
	Scrambled service	Service name and ID
	Transcoded service in a pool	Service name and ID and pool name

Input Port Setup

Setting up an input port differs with the port type. This section covers information on setting up both ASI and GbE ports.

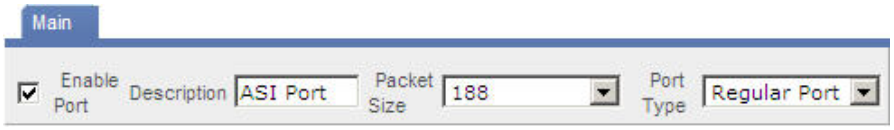
Setting Up Input ASI Ports

NOTE: Prior to configuration, define the ASI port as an input or output port. By default the port is an input port.

To configure an Input ASI port:

1. In the **Input** section, select a port.

   The **Main** section is updated accordingly.



2. 'To enable the port, select **Enable Port**.

TIP: Enable the port only once the port configuration is complete.

3. In **Description**, edit the default description.
4. In **Packet Size**, select the required packet size.

   You can select 188 (default), 204 or Auto. In the latter, ProStream automatically detects the packet size.

   In case of scrambling over ASI, select either 188 (default) or 204.

   In **Port Type**, normal usage calls for **Regular Port**. In an SFN application, **1PPS** is also available.
5. Click **Apply**.

   The port is enabled and its data can flow into the device.

Setting Up Input GbE Ports

The following table describes input redundancy modes.

Table 3-5: GbE Input Redundancy Modes

Parameter	Explanation
Independent Ports	Each port receives its own feed.

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Table 3-5: GbE Input Redundancy Modes

Parameter	Explanation
Manual	The redundancy switch is performed manually. The **Active Port** parameter appears and you can set the active port.
Automatic	The redundancy switch occurs automatically upon port failure. When the primary fails, the device automatically switches to the backup port and continues receiving content over this port unless it fails. The device switches to the primary port only when the backup fails.
Manual Revert	The redundancy switch occurs automatically upon port failure. However, switching back to the primary, when fixed, is performed manually. To revert back to the primary port, change the Port Usage to Automatic. Once the primary port is active, change Port Usage to Manual Revert.
Automatic Revert	The redundancy switch occurs automatically upon port failure. However, the device automatically switches to the primary when the primary has stabilized and even though the backup is still in order. The baseline is that the primary is preferred.

Setting GbE Port Redundancy

To set GbE Port Redundancy:

1. Double-click on the **GbE Card** needed.
2. Open the **Ports Usage** list and select one of the redundancy modes as explained in *Table 3-5*.

   Note the following regarding port redundancy:

   - By default, port 1 is the primary port and port 2 of the same IOM is the backup port.
   - Triggers for the port redundancy switch are: *Link down, SFP missing, CRC error*.

   Note the following regarding port redundancy:

   - By default, port 1 is the primary port and port 2 of the same IOM module is the backup port.
   - Triggers for the port redundancy switch are: *Link down, SFP missing, CRC error*.

Enabling a GbE Input port

Enabling a GbE input port requires the following setup:

- Port Configuration
- Socket Configuration

TIP: To prevent error messages, select **Enable Port** only after the port and socket configurations are completed.

To enable the Input GbE port:

1. Go to **Stream Config** and in the Input Hierarchy, click the required **Slot > GbE Card > GbE Port** > **Main** tab.
2. **Disable on No Stream** - Select to have the port automatically shift to Link Down when there is no stream detected at the port.

   Once a stream is detected, the port automatically shifts to Link Up.

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3. In **Description**, edit the default description.
4. In **Input Properties**, click **Port Configuration**.
5. Configure GbE Port Parameters:
   - **IP Address** - Type in the required IP address.
   - **Subnet Mask** - Type in the required subnet mask.
   - **Gateway** - Type in the IP address of the gateway.
   - **Route1 IP Address** - Type in the required IP address.
   - **Route1 Subnet Mask** - Type in the required subnet mask.
   - **Route2 IP Address** - Type in the required IP address.
   - **Route2 Subnet Mask** - Type in the required subnet mask.
   - **Auto Negotiation** - The Auto Negotiation is a handshake protocol used in GbE links.

NOTE: Activate the Auto Negotiation protocol only if the other end of the GbE link also uses auto negotiation.

The following fields in the GbE Port Configuration dialog box are Read Only and cannot be configured.

- **MAC Address** - View the physical address of the GbE as retrieved from the device.
- **SFP Vendor** - View the vendor of the SFP module mounted in the GbE port.
- **SFP Mode** - View the mode of the SFP module mounted in the GbE.
- **SFP Type** - View the type of SFP mounted. It can be either SX - usually used for short distances (up to 200 m) or LX - usually used for long distances (10km and up).

6. Under Advanced Options, configure the following:
   - **TX Only** - In case of a single direction link, select to define the port as a transmitting port.
   - Inter Packet Gap - Applies to GbE output ports only. Enter the required internal packet gap. The minimum allowed gap is 12 ticks. If the gap is less than 12, the alarm *The Inter Packet Gap is below 12 ticks* is raised.
   - **Loopback Mode** - Select to have the data sent back to the input port.
   - **Controlled by HHP** - Select to activate.
7. Click **Done** to save the new configuration.
8. To enable the port, go the **Main** tab and select **Enable Port**.
9. Click **Apply**.

The port is enabled and its data can flow into the device.

Input Socket Configuration

Content transmission of Video-over-IP utilizes sockets. Each socket is a terminal for a TS. The socket is defined by a unique combination of destination IP address and UDP port.

You can add up to 128 sockets with up to eight MPTS (Multi Protocol Transport Services) sockets. Each MPTS socket can stream up to 32 services.

NOTE: To change socket type (SPTS, MPTS), delete the socket and reconfigure with the new socket type.

You can add sockets either one by one or multiple sockets in one step. You can also delete sockets at any time.

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Socket IP Address

When defining the IP address of a socket, use the information in the following table:

Table 3–6: Socket IP Address Ranges

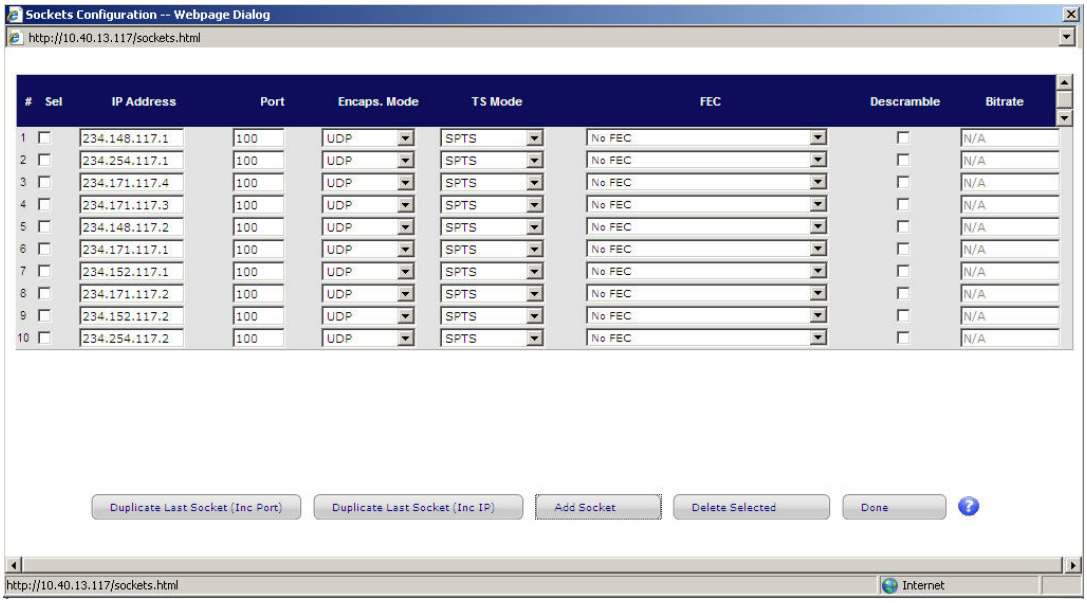
Type	Class	Available Range
Unicast	A	1.0.0.0 - 126.255.255.255
Unicast	B	128.0.0.0 - 191.255.255.255
Unicast	C	192.0.0.0 - 223.255.255.255
Multicast	D	224.0.0.0 - 239.255.255.255

NOTE: The following reserved ranges should not be used:
Reserved 224.0.0.0 - 224.0.0.255,
Reserved for administration 239.0.0.0 - 239.255.255.255

To configure a socket in a GbE port:

1. In the **Input Properties** section, click **Sockets Configuration**.

   The **Sockets Configuration** dialog box appears.



NOTE: This dialog box includes with horizontal and vertical scroll bars. To view the vertical scroll bar, scroll with the horizontal one to the right most side of the dialog. Scroll the horizontal one to view all configured sockets.

2. Do either of the following:
   - Define the parameters of existing sockets. See *Defining Socket Parameters*.
   - Add a socket as described in *Adding a Socket or Multiple Sockets*.

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Defining Socket Parameters

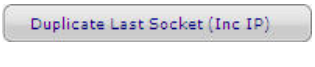
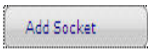
To define socket parameters:

- **Sel** - Click to select the socket prior to using any of the buttons of the dialog.
- **IP Address** - Enter an IP as explained in *Socket IP Address*.
- **Port** - Enter a port number. The available range is 1- 65535.
- **Encapsulation Mode** - Select one of the following:
  - UDP - According to the transmitter/receiver
  - RTP - According to the transmitter/receiver. If FEC is used, select RTP
  - HRTP - To receive a socket encapsulated in Harmonic RTP to allow connection between ProStream 1000 devices.
  - TCP - Input only. This applies to data transmitted at a low rate over TCP.
- **TS Mode** - Select one the following:
  - MPTS
  - SPTS
  - Data - see *ADI Application Note*.
  - CAS DATA
- **FEC** - Relates to the extra data that is sent on a separate socket(s) and includes the number of rows and columns to be calculated. A higher number of rows and column yields a higher overhead and a better error correction ability. Define the FEC parameters as follows:
  - No FEC - Forward Error Correction is not applied.
  - Pro-MPEG Annex B/SMPE 2022 Annex C: FEC standard. Select to read input with FEC data.
- **Descramble** - Select for Fixed Key descrambling. You can also configure this field in the Input Properties of a TS. When you select the Fixed Key option in the Descramble tab, this field is selected automatically
- **Bitrate** - Enter the required bitrate.

Adding a Socket or Multiple Sockets

The following table lists the available methods for adding a socket.

Table 3–7: Adding a Socket

Button	Explanation
	Adds a single socket with the last socket configuration with an incremented IP address
	Adds a single socket with the last socket configuration with an incremented port number
	Adds a single socket or multiple sockets

To add a socket:

1. In the **Socket Configuration** page, click **Add Socket**.
2. Define the IP Address (see *Socket IP Address*) and the port number.

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3. Click **Done**.

   The socket is added to the list. Continue the configuration as explained in *Defining Socket Parameters*.

To add multiple sockets:

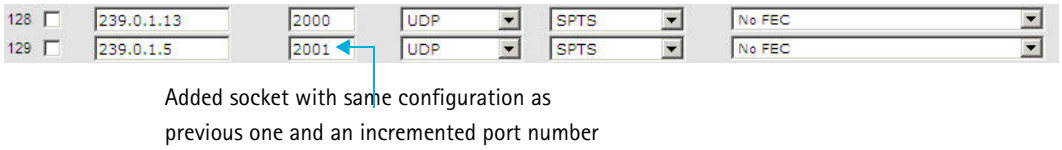
1. Select **Add Multiple Sockets** and define the IP Address (see *Socket IP Address*) and the UDP port.
2. In **Num of IPs**, enter the number of IPs.
3. In **Num of Ports**, enter the number of UDP ports.
4. Click **Done**.

   Multiple sockets are added to the list. Continue the configuration as shown in *Defining Socket Parameters*.

To add a single socket with an incremented port number:

- In the **Socket Configuration** page, click **Duplicate Last Socket (Inc Port)**.

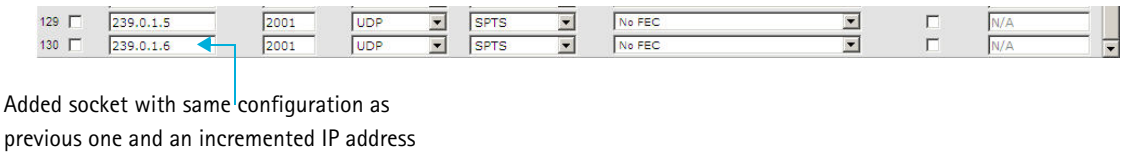
  The configuration of the last socket is duplicated and is the configuration of the newly added socket. The port number of the newly added socket is incremented by one.



To add a single socket with an incremented IP address:

- In the **Socket Configuration** page, click **Duplicate Last Socket (Inc IP)**.

  The configuration of the last socket is duplicated as is the configuration of the newly added socket. The IP address of the newly added socket is incremented by one.



Now you are ready to enable the GbE port as explained in *Setting Up Input GbE Ports*.

To delete the socket list:

1. To delete a socket, select the socket's **Select** check box.
2. Click **Delete Selected**.

   The required socket is deleted.

Transport Stream Extraction

To refresh input information from the Input port:

- Click **Refresh Input Information**.

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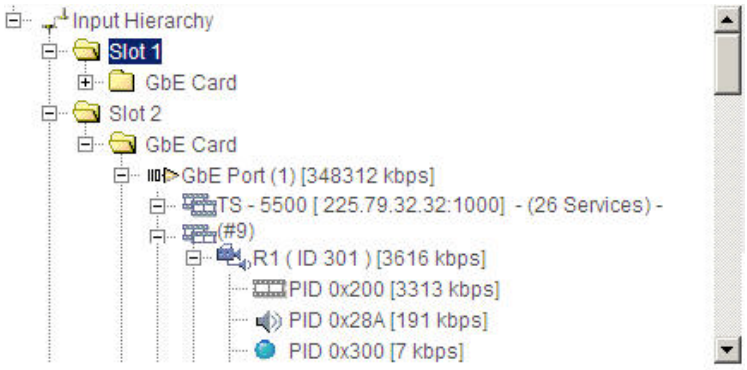
The display is updated as the application retrieves the information. When this is the first time you are reading information the ⊞ icon appears next to the port to indicate that you can look at its content.

Configuring Input Information

Both **Input** and **Input Properties** sections provide information on the input stream.

Input section

The **Input** section provides a general view of the input stream and you can drill down a slot to view its components all the way to the PIDs.



TIP: To view slot, card, port, socket, or transport stream components, click ⊞ next to the required item which contains the components in question, or double-click the item.

Viewing TSA components

If you drill down a service you can view its PIDs. If the TS includes PSIP tables, the PIDs of the PSIP tables appear as ghost PIDs. The ghost PID 0x1FFB always appears and the appearance of the other ghost PIDs depends on the PSIP data.

Usually TSs appear with their ID number, and for a GbE port - the socket, and number of services included in the TS.

However, TSs might be disabled or unknown as the following table shows:

Table 3–8: TS Information at the Input Port

TS Status	Explanation
Enabled	TS appears with ID number. ASI port - Also the number of services and bitrate. GbE port - Also socket information, number of services, bitrate and TS index number.
Disabled	The port is disabled. TS services are also disabled.
Unknown	Port is enabled and data is flowing in. However, ProStream cannot extract input data.

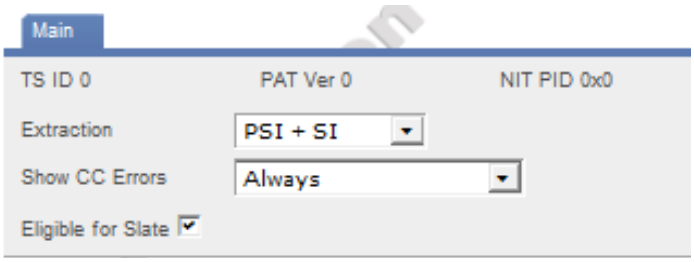
NOTE: With an ASI input/output port, the Input/Output section enables you to set the packet size. See *Setting Up Input ASI Ports*.

Input Properties section

The **Input Properties** section provides essential information about an item selected in the **Input** section. Some of this information is read only and is helpful for provisioning the output stream. The following sections describe the information displayed in the **Input Properties** according to the selected item in the **Input** section:

ASI TS Information

When you select a TS in the Input section and the TS flows into the device over an ASI port, the following information appears in the Input Properties section:



Configuring Input ASI TS

To configure an Input ASI TS:

1. Set **Extraction**. Options include:
   - Disable - No extraction is available.
   - Ghosts only - Displays all PIDs of the TS as ghost PIDs.
   - PSI only - Extracts the PAT PMT and CAT tables.
   - PSI + SI - Extracts the PAT, PMT, CAT, SDT and NIT tables.
   - PSIP - Extracts the supported PSIP tables.
2. Set **Show CC Errors**. Options include:
   - Always
   - Never

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- Passthrough PIDs

3. **Eligible for Slate** - Select to engage.

The following fields are Read Only:

4. **TS ID** - ID number of the selected TS.
5. **PAT Ver** - Shows the Program Association Table version ID. This version is incremented every time the PAT data is changed.
6. **NIT PID** - Shows the PID of the Network Information Table in hexidecimal form.

GbE TS Extraction

When you select a TS in the Input section and the TS flows in the device over a GbE port, the following information appears in the Input Properties section:

- General tab

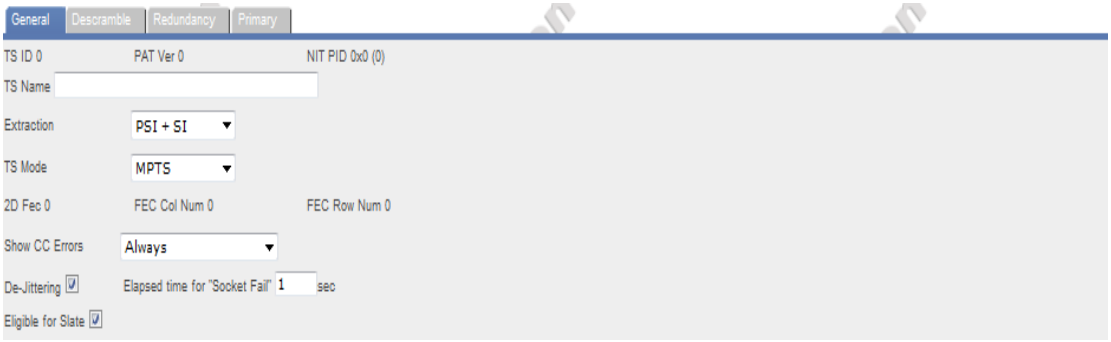


Table 3–9: GbE TS Extraction – General tab

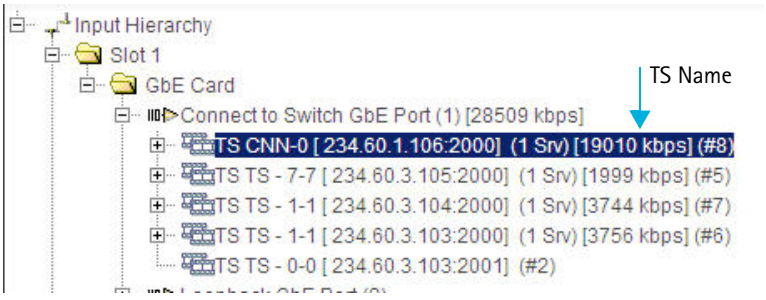
Parameter	Explanation
TS ID	The ID number of the selected TS.
PAT Version	The PAT's (Program Association Table) version identification. This version is incremented every time the PAT's data is changed.
NIT PID	The PID of the Network Information Table.
TS Name	Enter a name for the TS. You can enter up to 40 characters. Once you click anywhere in the General tab, the name is updated in the tree view. The name appears as follows: TS <TS Name>-<TS ID> 
Extract. Mode	Enables you to select the requested extraction. See *Selecting Extraction Mode*

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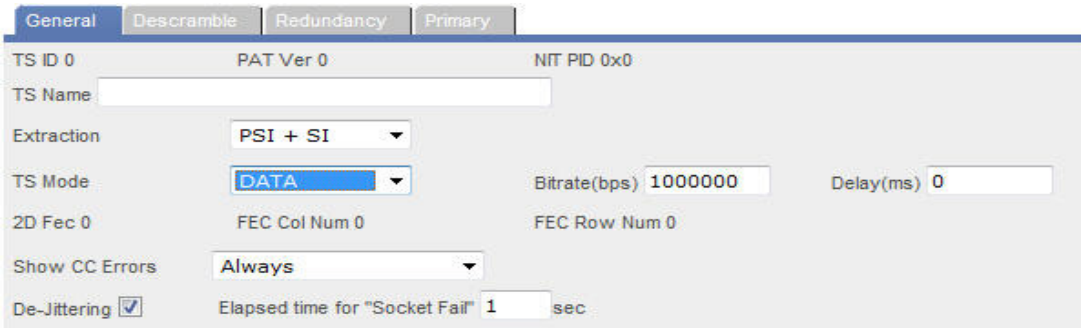
Table 3–9: GbE TS Extraction - General tab

Parameter	Explanation
TS-Mode	Enables you to select the requested TS mode: SPTS, MPTS, or Data
Show CC Errors	For Continuity Counter errors, select one of the following options: ■ Always ■ Never ■ For Passed PIDs Only
Elapsed Time for Socket Fail	Define, in seconds, the elapsed time between detecting a problem in the input port and raising the *Socket Fail* alarm.
FEC	Indicates FEC parameters when configured to read input with FEC parameters. See *Defining Socket Parameters*.
De-Jittering	Select to recover video directly from the jittered and noisy frames. De-Jittering should be unchecked for: ■ CAS Data IP input TS. ■ When SFN is enabled, Low Delay=1
Bitrate	Applies to TS-Mode Data only. Enter the required input bitrate. See following picture
Delay	Available when IP Transport Type is Data Specifies a delay for the data stream (PID) for the purpose of synchronizing subtitles. The range is 0 to 7000 milliseconds. The default is 0 (no delay). See following picture
Eligible for Slate	Select to enable a TS for slate configuration



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- Descramble tab

Table 3–10: GbE TS Extraction - De-scramble tab

Parameter	Explanation
No Descrambling	select when De-scrambling is not required
CWS Usage	select in AES application
Fixed Key Usage	select when fixed key is required

- Primary

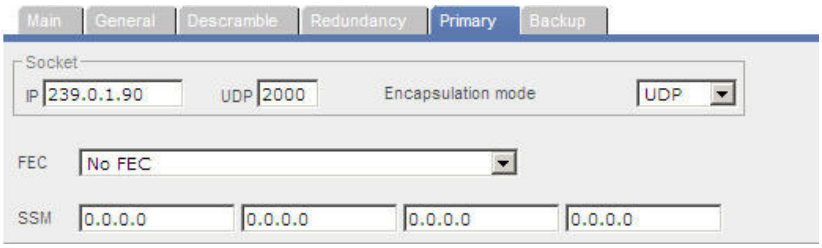
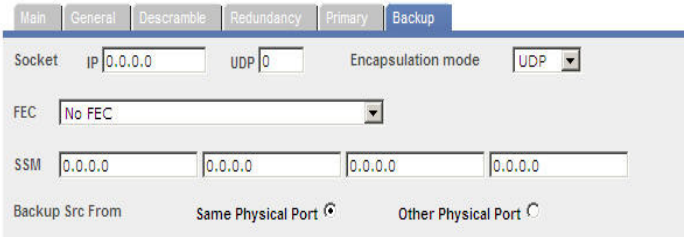


Table 3–11: GbE TS Extraction - Primary tab

Parameter	Explanation
Socket IP	Enter the IP address of the socket.
Socket UDP	Enter the required UDP.
Encapsulation Mode	Select the required encapsulation mode.
FEC	Select if you want to read input with FEC. See *Defining Socket Parameters*.
SSM	Source Specific Multicast. This feature allows you to define up to four different sources for the TS by entering the IP address of the upstream transmitting devices. This feature is relevant only when working in GMPv3.

- Backup



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The backup socket includes the same content as the primary socket. However, primary and backup can have different Encapsulation modes, FEC and sets of SSM addresses.

NOTE: You can define a backup socket on the same port as the primary or on a different port but it should be on the same IOM

Table 3–12: GbE TS Extraction – Backup tab

Parameter	Explanation
Socket IP	Enter the IP address of the backup socket.
Socket UDP	Enter the required UDP.
Encapsulation Mode	Select the required encapsulation mode.
FEC	Select whether to read input with FEC. See *Defining Socket Parameters*.
SSM	Source Specific Multicast. This feature allows you to define up to four different sources for the TS by entering the IP address of the upstream transmitting devices. This feature is relevant only when working in GMPv3.
Backup Scr From	■ Same Physical Port - primary and backup sockets are on the same physical port. ■ Other Physical Port - primary and backup ports are on different ports of the same IOM.

Selecting Extraction Mode

To select the extraction mode:

1. In **Input**, select a TS.
2. In **Input Properties**, select the required extraction mode:
   - ❑ Disable - No extraction is available
   - ❑ Ghosts only - Displays all PIDs of the TS as ghost PIDs.
   - ❑ PSI only - Extracts the PAT PMT and CAT tables.
   - ❑ PSI + SI - Extracts the PAT, PMT, CAT, SDT and NIT tables.
   - ❑ PSIP - Extracts the supported PSIP tables.
3. Click **Apply**.
4. Click **Refresh Input**.

   The TS appears with the required extraction mode.

GbE Input Redundancy

The following section describes the redundancy mechanism for input GbE ports and sockets.

Configuring socket redundancy includes the following stages:

- Configuring a primary and a backup socket.

  The backup socket includes the same content as the primary socket. However, primary and backup can have different Encapsulation modes, FEC and sets of SSM addresses.

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You can define a backup socket on the same port as the primary or on a different port but it should be on the same IOM module.

- Selecting the required redundancy mode. The following table lists the available modes:

Table 3–13: GbE Input Redundancy modes

Parameter	Explanation
None	No redundancy is required
Manual	The redundancy switch is performed manually
Automatic	The redundancy switch occurs automatically according to the predefined triggers. The device automatically switches between primary and backup according to their activation status. Switching from the active one to the non-active occurs upon the failure of the active one if the non-active is working.
Manual Revert	The redundancy switch occurs automatically according to the predefined triggers. However, switching back to the primary, when fixed, is performed manually.
Automatic Revert	The redundancy switch occurs automatically according to the predefined triggers. However, the device automatically switches to the primary when the primary is stabilized and even though the backup is still in order. The baseline is that the primary is preferred. For each trigger you can define the stabilized time. See *Configuring Redundancy for GbE Input Socket - Automatic Revert Mode*.

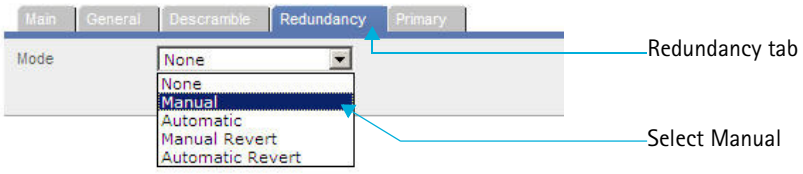
- Defining redundancy triggers per socket
- If you select Automatic revert, configuring stabilization time per redundancy trigger.

Configuring Redundancy for GbE Input Socket – Manual Mode

To configure redundancy for GbE input sockets in manual mode:

1. Open the device browser and login.

   See *Logging into the Device*.
2. Select the **Stream Config** tab.
3. In the Input section, select the required socket and the **Redundancy** tab.
4. Open the **Mode** list and select **Manual**.



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In the **Redundancy** tab, the following takes place:

- The activated option appears
- The Backup tab appears

5. View the current active socket.
6. In **Active**, select the required socket.

   If the primary failed, open the **Active** list and select Backup to manually switch sockets.
7. Select the Primary tab and configure the primary socket. See *GbE TS Extraction*.
8. Select the Backup tab and configure the backup socket. See *GbE TS Extraction*.

Configuring Redundancy for GbE Input Socket - Automatic Mode

By default, the alarm *Socket Not Active* is always a trigger. You can view the elapsed time between detecting a problem in the input port and raising the *Socket Fail* alarm. To configure this threshold, see *Table 3–9*.

For other triggers, define whether to activate them as triggers for the redundancy switch and the threshold for the redundancy switch.

When selecting Automatic mode, configure the triggers for the redundancy switch.

The following table shows the available triggers and provides important information per trigger.

Table 3–14: Triggers for Socket Redundancy

Trigger	Explanation
Bitrate Underflow	Default threshold is 5 seconds. If for five seconds, the bitrate is lower than the minimum expected bitrate, a redundancy switch will take place.
Missing PAT	Default threshold is 2 seconds.
Missing PMT	Default threshold is 2 seconds PMT PID should be the same for primary and backup sockets. This trigger requires also PAT missing as a trigger.
CC Err	Default threshold is 60 seconds and default number of errors is 4. For example, if during 60 seconds four counter errors occurred, a redundancy switch takes place.
Scrambled A/V	Based on Scrambling Counter Bits for the routed A/V PIDs only.

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Table 3–14: Triggers for Socket Redundancy

Trigger	Explanation
PID Underflow	You can configure each routed PID (ghost, EMM, ECM, ES, not on ES) to be monitored for this trigger. Minimum bitrate - can be 0, which means PID missing, or greater than 10k. Note: All A/V PIDs under reference service are marked automatically as a trigger with 0 bitrate threshold. PID Underflow does not apply to the following: ■ DPI PID ■ Generated, re-generated tables and PID range

The Bitrate Underflow and the Scrambled A/V triggers raise an alarm only when they are enabled triggers.

To configure redundancy Automatic mode:

1. Open the device browser and log in. See *Logging into the Device*.
2. Select the **Stream Config** tab.
3. In the Input section, select the required socket and the **Redundancy** tab.
4. Open the **Mode** list and select **Automatic**.

   In the **Redundancy** tab, the following takes place:
   - ❑ Indication of the activated socket appears
   - ❑ The Backup tab appears
   - ❑ Triggers section appears
5. View the following:
   - ❑ View the currently activated socket
   - ❑ View the threshold for Socket Not Active
6. Enable/disable each trigger.
7. If enabled, set the threshold time in seconds.
8. Select the Primary tab and configure the primary socket. See *GbE TS Extraction*.
9. Select the Backup tab and configure the backup socket. See *GbE TS Extraction*.

Configuring Redundancy for GbE Input Socket – Manual Revert Mode

When selecting the Manual Revert mode, configure the triggers for the redundancy switch.

After a redundancy switch, if you wish to revert to the primary socket, change the mode to Manual and revert, as explained below:

To configure redundancy in Manual Revert mode:

1. Open the device browser and log in. See *Logging into the Device*.
2. Select the **Stream Config** tab.
3. In the Input section, select the required socket and the **Redundancy** tab.
4. Open the **Mode** list and select **Manual Revert**.

   In the **Redundancy** tab, the following takes place:
   - ❑ Indication of the activated socket appears
   - ❑ The Backup tab appears

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- Triggers section appears

5. View the following:
   - View the currently activated socket
   - View the threshold for Socket Not Active
6. For each trigger, enable/disable it, if enabled, set the threshold time in seconds.

   See *Table 3–14*.
7. Select the Primary tab and configure the primary socket.

   See *GbE TS Extraction*.
8. Select the Backup tab and configure the backup socket.

   See *GbE TS Extraction*.
9. Following a redundancy switch, to revert back to primary, open the Mode list and select **Manual**.
10. Open the **Activate** list and select **Primary**.

Configuring Redundancy for GbE Input Socket – Automatic Revert Mode

Define for each trigger whether to activate it as a trigger for the redundancy switch and the threshold for the redundancy switch.

If you select Automatic Revert, you also need to configure the stabilization time. The stabilization time should be longer than the configured failover time.

To configure redundancy in Automatic Revert mode:

1. Open the device browser and login. See *Logging into the Device*.
2. Select the **Stream Config** tab.
3. In the Input section, select the required socket and the **Redundancy** tab.
4. Ope n the **Mode** list and select **Manual Revert**.

   In the **Redundancy** tab, the following takes place:
   - Indication of the activated socket appears
   - The Backup tab appears
   - Triggers section appears
5. View the following:
   - View the currently activated socket
   - View the threshold for Socket Not Active
6. For each trigger, enable/disable it, and if enabled, set the threshold time in seconds. See *Table 3–14*.
7. For each enabled trigger, set the stabilization time as follows:
   - Bitrate Auto Revert: Default stabilization time is 60 seconds.
   - PAT/PMT Auto Revert: Default stabilization time is 10 seconds.
   - CC Error Auto Revert: Default stabilization time is 600 seconds and default number of errors is 4. For example, if during 600 seconds four counter errors did occurred, automatic revert takes place.
8. Select the Primary tab and configure the primary socket.

   See *GbE TS Extraction*.
9. Select the Backup tab and configure the backup socket.

   See *GbE TS Extraction*.

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Service Information

When you select a service in the Input section, the following information appears in the Input Properties section:

Service Extraction – Main Tab

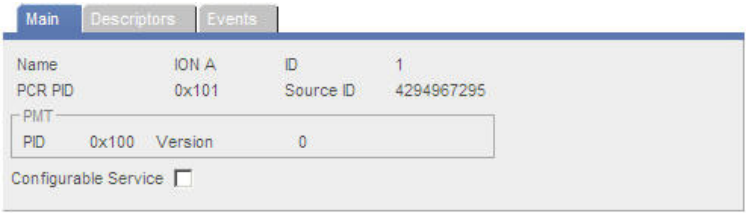

Table 3–15: Service Extraction – Main tab

Parameter	Explanation
Name	The service name as extracted from the Service Description Table (SDT).
Service ID	The service identification number.
PMT PID	The PID over which the service's PMT (Program Map Table) is transmitted.
PMT Version	The PMT's version identification. This version is incremented every time the PMT's data changes (e.g. the Video PID changes).
PID	The PID of the service (Program Clock Reference).
Source ID	A PSIP parameter
Descriptors	Any additional information regarding the service. This field appears either as a link or disabled (gray and italicized).
Configurable Service	Select to display the Configurable Service parameters. This section applies to a unit that functions as an Edge Descrambler Unit (EDU). See *EDU Software User Guide*.

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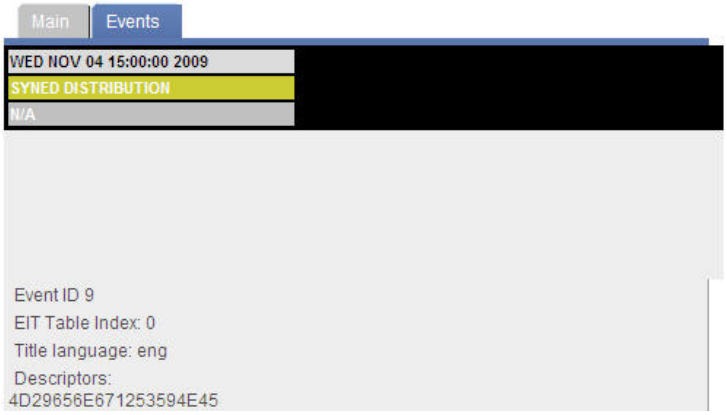
Service Extraction - Event Tab

This tab displays events.



Viewing Descriptors

A descriptor includes additional information regarding the service. To view the descriptor associated with the input component, see the following instructions:

To view the descriptor:

1. Select the **Descriptor** tab. View the descriptor details.

   All descriptors appear in a hex-decimal format.

PID Information

Table 3–16: PID Extraction

Parameter	Explanation
PID	Indicates the PID number
PID Type	The type of data carried over a specific elementary stream
Scrambled	Indicates whether scrambled
Descriptors	Any additional information regarding the PID. To view the PID descriptor, select the Descriptor tab. The tab is enabled if a descriptor is associated with the PID. For further information, refer to *Viewing Descriptors*.

ECM Information

NOTE: ECM information is irrelevant when using Fixed Key.

Table 3–17: ECM Extraction

Parameter	Explanation
PID	Indicates the PID number
PID Type	The type of data carried over a specific elementary stream.

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Table 3–17: ECM Extraction

Parameter	Explanation
Scrambled	Indicates that this is a scrambled PID as the CA descriptor indicates.
CAS ID	16 bit CAS vendor ID.

EDU - Descrambling a Service

When ProStream 1000 operates as an Edge Descrambler Unit (EDU), you can configure an input service to be descrambled when flowing into the device. The setup comprises two parts:

Configure to descramble a service that appears in the input extraction

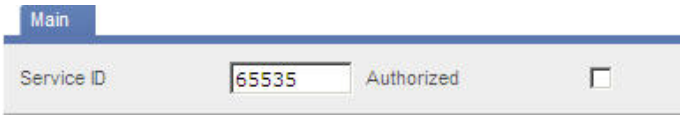
Create a new input service and configure to descramble it when flowing into the device.

To configure to descramble a service in the extraction:

1. Select the **Stream Config** tab.
2. In the input section select the required service.
3. In the **Main** tab, select **Authorize**.

To configure a new input service to be descrambled:

1. Select the **Stream Config** tab.
2. In the input section select the required TS.
3. Click the **New Service In** button in the Multiplexing buttons section.
4. Select the newly created service and configure it as follows:



- Service ID - enter the required service ID.
- Authorized - select to have services unscrambled when flowing into the device.

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Chapter 4
Output Configuration

Configuring Output Ports and Provisioning the ProStream

The procedure for configuring the output ports and for provisioning the ProStream includes several stages. The order in which you perform these stages varies according to the output port. However, the essential stage is provisioning the device.

Defining Broadcasting Networks

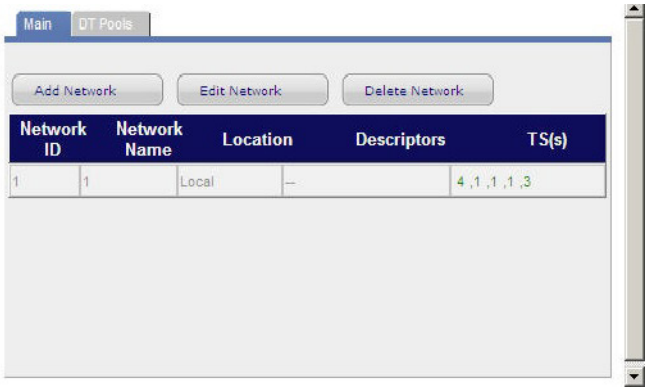
To organize the broadcasting devices, you can define networks and later on associate Transport Streams (TSs) to the required networks. A network may include the following types of TSs:

- Local TS - TS is transmitted by the device you are currently configuring
- External TS - TS is transmitted by another device on one of the networks of your device. If a NIT table is generated for the network, the NIT also points to the external TSs.

To define networks:

1. Open the Web client of the device.
2. Select the **Stream Config** page.
3. In Output, select the **Output Hierarchy** node.

The Output Networks pane appears.



To add a network:

1. In the Output Networks pane, click **Add Network**.

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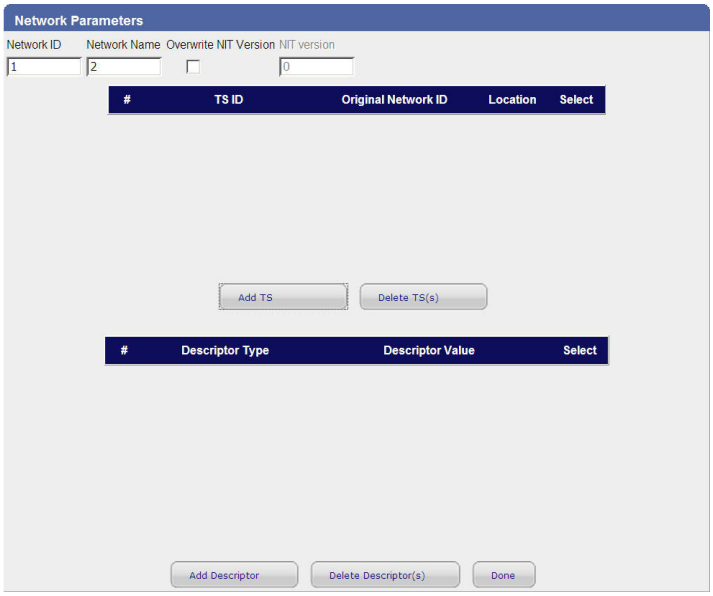
The Network Parameters dialog box appears.



2. In **Network ID**, type the required Network ID.

   By default, a number in sequence with the last defined network appears. You can enter the required network ID as long as this value is not used as another network ID.
3. In **Network Name**, type the required name.
4. To overwrite the NIT version, select **Overwrite NIT version**.

   The **NIT Version** box becomes enabled.
5. In **NIT Version**, type the required NIT version.

   For NIT descriptors, see *Provisioning the Output TS*.

TIP: Local TSs are associated with the network when configuring the TSs.

To add an external TS:

1. Click **Add TS**.

NOTE: Local TSs are added while configuring the TS. See *Provisioning the Output TS*.

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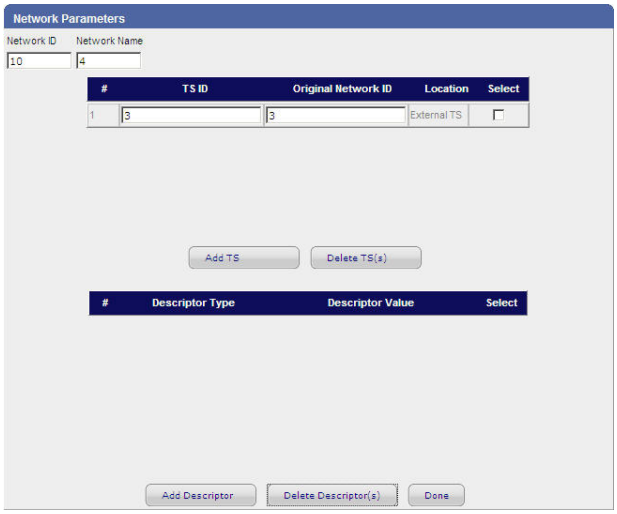
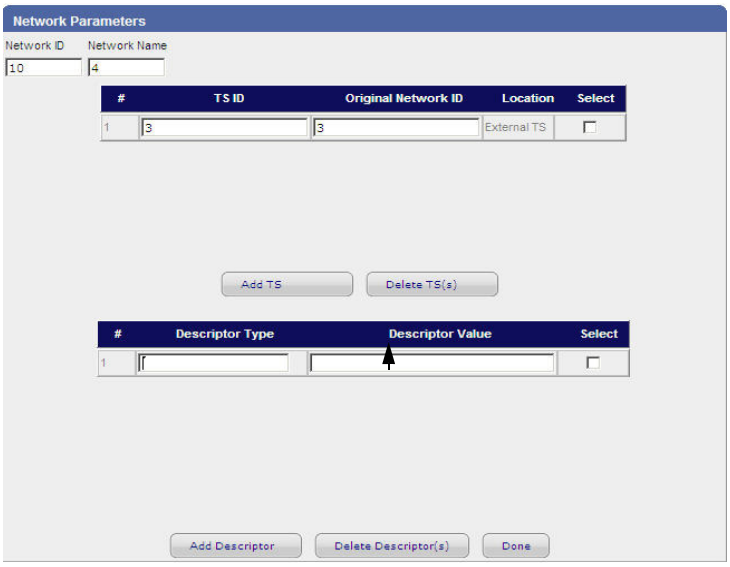
A row is added to the TS section.



2. Enter the following information:
   - TS ID - Enter the required TS ID
   - Original Network ID - Enter the network ID of the originating delivery system.
   - Location - either of the following:
     - Local - TS is transmitted by the device
     - External - TS is transmitted by another device

To add a network descriptor:

1. Click **Add Descriptor**.



   A row is added to the Descriptor section.

2. Enter the following information:
   - Descriptor Type - Enter the descriptor type as defined by the DVB standard.
   - Descriptor Value - Enter the value according to the SDV standard.

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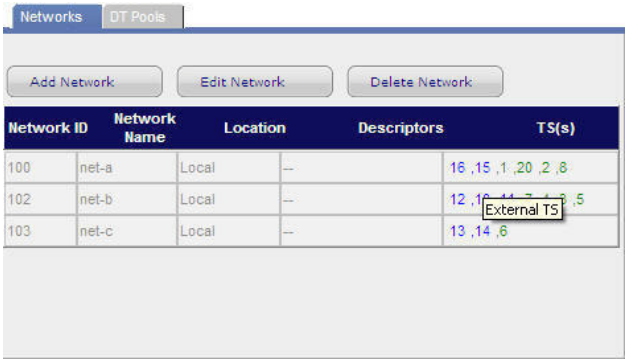
TIP: If the TS is transmitted with a NIT, the NIT points to both local and external TSs and the table includes all configured descriptors.

3. Click **Done**.

   The **Main** tab is updated and displays the newly added network. It also includes the associated TSs. Local TSs appear in green and external TSs in blue. If you hover the pointer over a TS, a tip appears with the TS information.



To edit a network:

1. Select **Output Hierarchy** > **Main** tab.
2. Do either of the following:
   - Select the record of the required network and click **Edit Network**.
   - Double click the required network record.

   The **Network Parameters** page appears.

To delete a network:

1. Select **Output Hierarchy** > **Main** tab.
2. Select the required network record.

TIP: To select multiple network-records, press <Ctrl> while selecting the required records.

3. Click **Delete Network**.

   The network is removed from the table.

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Configuring the Output Socket - GbE Output Port Only

To output streams via a GbE output port, configure the sockets first. A socket is a terminal for a TS. Each socket is defined by a unique combination of an IP address and UDP port.

You can add up to 128 sockets and add multiple sockets in one step. In addition, you can delete sockets at any time.

To configure a socket:

1. In the **Output** section, select a GbE port.
2. Click **Sockets Configuration**.
3. Do either of the following:
   - Edit the parameters of an existing socket. See *Configuring the Output Socket Parameters*.
   - Add a socket or sockets. See *Adding a Socket or Multiple Sockets*.
4. Click **Done** to save the configuration.
5. Click **Apply** to send the configuration to the device.
6. Continue by provisioning the TSs.

   See *Provisioning the Output TS*.

Configuring the Output Socket Parameters

The following table describes the type, class and available range of destination IP addresses to be used when configuring output sockets parameters.

Table 4-1: Destination IP Address

Type	Class	Available Range
Unicast	A	1.0.0.0 - 126.255.255.255
Unicast	B	128.0.0.0 - 191.255.255.255
Unicast	C	192.0.0.0 - 223.255.255.255
Multicast	D	224.0.0.0 - 239.255.255.255

NOTE: The following reserved ranges should not be used:
Reserved: 224.0.0.0 - 224.0.0.255,
Reserved for administration: 239.0.0.0 - 239.255.255.255

To configure output socket parameters:

1. Go to **Main > Sockets Configuration** and type the destination IP address according to the *Table 4-1*.
2. **Port** - Enter the UDP port. The available range is 1- 65535.

TIP: You can sort IP/UDP columns by double-clicking the columns headings.

3. **Shaping Mode** - Select either of the following to control the traffic:
   - Best Effort - The best bitrate you can allocate to the socket based on the input bitrate.
   - Null Padding - Null PIDs are added to maintain the bitrate. See also *Provisioning the Output TS*.

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4. **Bitrate** - Enter the required bitrate for the TS.
5. **Encaps. Mode** - Select the Encapsulation Mode from the drop-down list:
   - UDP - According to the transmitter/receiver.
   - RTP - According to the transmitter/receiver. If FEC is used, select RTP.
   - HRTP - N/A for a standalone version.
   - TCP - Input only. It applies to low bitrate data that is transmitted over TCP.
6. **FEC** - Define the FEC parameters as follows:
   - **No FEC** - Forward Error Correction is not applied.
   - **Pro-MPEG Annex B/SMPE 2202 Annex C** - Select to apply FEC.
   - **Col** - Enter the number of columns if FEC is applied.
   - **Rows** - Enter the number of rows if FEC is applied
   - **2D FEC** - Select this option to enable the 2-dimensional Forward Error Correction option, that is, the calculation includes columns only.
7. **Static Mode** - Select this option to enable static mode and to allow editing the **Destination Static MAC**.
8. **Destination Static MAC** - When Static Mode is enabled, enter the Static MAC of the destination port of the TS.
9. **IP Packet Size** - Select the required IP packet. See *To provision the output TS over GbE port or ASI port:*.
10. **Enable** - Select to bring the socket online.
11. **Done** - Click **Done** to save the configuration.

Deleting an Output TS

To delete an Output TS:

1. Go to **Main > Sockets Configuration**
2. In the **Sel** column, select the check box corresponding to the socket you want to delete.
3. Click **Delete Selected** to remove the socket from the sockets list.

Provisioning the Output TS

When provisioning the output TS, you can do the following:

- Associate the TS with a network ID.
- Determine which tables to create in the TS level. Available tables vary according to the port type that outputs the TS.
- Set time zones (advanced configuration), if broadcasting time offset information (TOT) is important.
- Define whether to scramble with a fixed key.
- Define whether to mirror the TS.

NOTE: The following instructions refer to TSs to be output over a GbE port or ASI port, unless indicated otherwise.

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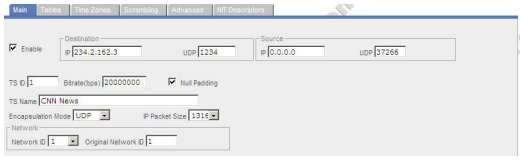
To provision the output TS over GbE port or ASI port:

1. In the **Output** section, select a TS.

   The page is updated with the relevant tabs.

2. For a GbE Port - In the **Main** tab, define the following parameters of the output TS:
   - To enable the output TS, click **Enable**.
   - Under **Destination**, in **IP**, enter the destination IP of the output TS and in **UDP**, enter the destination UDP port.
   - Under **Source**, to overwrite the source IP address, enter in **IP** the required IP address and in **UDP** the required UDP port.
   - In **TS ID**, enter the required ID number.
   - In **Bitrate (bps)**, enter the required bitrate.
   - To apply null padding, select **Null Padding**.
   - To add a name to the TS, enter a name in the TS Name box. You can enter up to 40 characters. Once you click any where in the Main tab, the name appears in the tree view as follows: TS <TS name>-<TS ID>.



   - Open the **Encapsulation Mode** list and select either UDP or RTP encapsulation mode.

3. Open the IP Packet Size and select the IP packet size ranging from 188 - 1316 bytes.

   See *Table 4–2*.

4. Under **Network**, open the **Network ID** list and select the network ID.

   The list is populated with the networks IDs defined during Network configuration.

   See *Defining Broadcasting Networks*.

5. In **Original Network ID**, enter the original network ID according to the SDV standard.

6. For ASI - In the **Main** tab, define the following parameters of the output TS:
   - In **TS ID**, enter the required ID number.
   - Under **Network**, open the **Network ID** list and select the network ID.
   - The list is populated with the networks IDs defined during Network configuration. See *Defining Broadcasting Networks*.
   - In **Original Network** enter the required network ID as defined by the SDV standard.

NOTE: The Network configuration is automatically reflected in Output Hierarchy > Main tab.

   - In **TS Name**, enter a name for the TS.

You can enter up to 40 characters. Clicking anywhere in the **Main** tab displays the name in the tree view. It appears as follows: TS <TS name>-<TS ID>.

Packet Size

The packet size is derived from the number of MPEG packets that are packed in a single IP packet, as indicated in the following table.

Table 4–2: IP Packet Size

IP Packet Size	MPEG Packet
1316	7
1128	6
940	5
752	4
564	3
376	2
188	1

NOTE: The larger the IP packet size is, the more MPEG packets it carries and the overhead is smaller.

Configuring Output TS PIDS

The following table describes the TS tables used for output TS PIDs.

Table 4–3: TS Tables

Option	Explanation
PAT	Creates a Program Associated Table that contains the PMT PIDs of all services included in the TS. In **PAT Spooling Frequency (PAT/Sec)**, enter the required spooling per one second.
TDT	ProStream creates a Time Date Table.
CAT	ProStream creates a Conditional Access Table. This table contains information that is used by an access device (such as a set top box with a smart card) to decode programs that are part of a Conditional Access System. See also *Allocating EMM PIDs*
TOT	ProStream creates a Time Offset Table. Click the Create TOT link to configure the TOT time zones. See, *Step 2*.

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Table 4–3: TS Tables

Option	Explanation
SDT	ProStream creates a Service Description Table (SDT). This table contains data describing the services, e.g., the names of services, the service provider, etc. Select either of the following: ■ Actual - SDT relates to all services of the TS. When **Actual** is selected, you can also select **Other**. ■ Other - SDT relates to all services of TSs that belong to the same network, that is that have the same network ID. Note: Define all required SDT parameters. Other wise, SDT table includes the default values. See *Defining General Service Parameters*.
NIT	In NIT (Network Information Table), select one of the following: ■ None - NIT is not transmitted with the TS ■ Actual Only - NIT relates to the network of the selected TS only ■ Actual and Other - Both NIT actual and Other tables are generated. NIT Other table relates to TSs with network IDs that are different than the selected TS ■ Ref in PAT Only - Adds to the PAT a pointer that the TS carries a NIT.
Regeneration Mode	Applies to GbE ports only. Select one of the following: ■ None - Don't regenerate any tables ■ DVB - Regenerate DVB related tables only ■ PSIP - Regenerate PSIP tables only, such as STT, VCT and EIT. See *Regenerating PSIP Tables*.

Defining Advanced GbE Output TS Parameters

The following table describes the TS over GbE parameters.

Table 4–4: TS over GbE Parameters

Parameter	Explanation
FEC	Select either of the following: ■ No FEC ■ Pro-MPEG Annex B/SMPTE 2022 Annex C - FEC standard to output with FEC. See *Configuring the Output Socket Parameters*.
FEC Col Num	Define the number of columns.
FEC Row Num	Define the number of rows.
2D FEC	Select to allow two-dimensional FEC.
Mirror of	Select the output socket to be duplicated to a mirror port for monitoring.
Mirror Force Clear	Select to mirror the socket as a clear stream.
Static MAC	Select to enable static MAC.

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Table 4–4: TS over GbE Parameters

Parameter	Explanation
TTL	Time To Leave. A limit on the period of time or number of iterations or transmissions that a packet can experience before it should be discarded.
DSCP	Differentiated Services Codepoint. Enter 0 or 1 to define the way an IP packet is queued while waiting to be forwarded within a router.
Stream Descriptor TAG Filters	You can remove input descriptors in TS level, resulting in removing the indicated input descriptors from all services of the output TS. To filter the input descriptors, enter in the **Stream Descriptors TAG Filters** box the descriptor TAGs you wish to remove from the output TS. See also, *PID Advanced Options*.

To configure the PIDs of an Output TS:

1. Under the **Tables** tab, select the required check boxes as described in *Table 4-3*.
2. To configure Time Zones, especially if the broadcast includes time offset information (Create TOT is selected), click the **Time Zone** tab.
3. Click **Add Time Zone**.
4. Define the following fields:
   - Country Code - Type in the country code.
   - Country Region ID - Type in the ID of the region.
   - Local Time Offset - Select the local time offset according to GMT.
   - Time of Change - Type in the Day Light Saving date according to the required format: dd/mm/yyyy hh:mm:ss.
   - Next Time Offset - Select the local time according to GMT in which Day Light Saving is expected to change.
   - Select - Select this box if you wish to cancel this row. Once you click Delete selected, the selected row is removed from the table.
5. To configure scrambling options, select the **Scrambling** tab.
6. Open the list and select one of the following options:
   - No Scrambling - No scrambling is required and the TS is output as a clear transport. Select this option in Fixed Key application on the Descrambler.
   - Fixed Key - Select to allow scrambling each socket with a different key. It prevents mass de-scrambling by unauthorized viewers in the event that the keys are unveiled. Select this option in Fixed Key application on the Scrambler.
7. To define advanced configuration, select the **Advanced** tab.
8. To define an advanced ASI output TS, set the following:
   - Mirror Of - Select the TS to be duplicated to a mirror TS for monitoring. See *TS Mirroring*.
   - Mirror Force Clear - Select to mirror the socket as a clear stream
   - Encryption TAN - Applies to Sky Italia only. Open the list and select one of the following encryption methods: None (default NDS encryption algorithm), 1,2, or 3.
   - Stream Descriptor TAG Filters - You can remove input descriptors in TS level, resulting in removing the indicated input descriptors from all services of the output TS. To filter the input descriptors, enter in the **Stream Descriptors TAG Filters** box the descriptor TAGs you wish to remove from the output TS:

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See also *PID Advanced Options*.

9. Click **Done** to save the configuration.

Configuring NIT Descriptors

The NIT Configuration is done via the NIT Descriptors Settings dialog box. The descriptors are listed in the Descriptor Tag list. The list is organized as follows:

Table 4–5: Descriptors in NIT Descriptor Tag List

Sections of List	Explanation
Pre-defined descriptors	This section is marked by a blue line. It Includes the following four descriptors that appear above the blue line: ■ 0x43 Satellite delivery info ■ 0x44 Cable delivery info ■ 0x5a Terrestrial delivery info ■ 0x33 Logical channel number
Descriptors	This section is below the blue line. It includes descriptors that you need to define by entering the descriptor details in hexadecimal. See *Standard ES Types and Descriptors*.
Other	This section enables you to add and define required descriptors that are not included in the list. Enter the descriptor details (descriptor type and value) according to the standard.

To configure NIT descriptors:

1. In the Descriptors tab, click **Add Descriptor**.

   The NIT Descriptors Settings dialog box opens.

2. Click the **Descriptor Tag drop-down** list and do one of the following:
   - Select a pre-defined descriptor - above the blue line:
     - 0x43 Satellite delivery info, see *Configuring Satellite Delivery Type*
     - 0x44 Cable delivery info, see *Configuring Cable Delivery Type*
     - 0x5a Terrestrial delivery info, see *Configuring Terrestrial Delivery Type*
     - 0x33 Logical channel number, see *Configuring Logical Channel Number (LCN) Type*
   - Define a descriptor - below the blue line:
     - Select the required descriptor type.
     - Enter the descriptor details in hexadecimal. See *Standard ES Types and Descriptors*.
   - Define a NIT descriptor that is other than those listed:
     - Open the Descriptor Tag list and select **Other**.
     - In the **New Tag** field, enter the required tag.
     - In **Content**, enter the descriptor details in hexadecimal. See *Standard ES Types and Descriptors*.
3. Click **Done** to save the configuration.

Configuring Satellite Delivery Type

To configure for satellite delivery, select:

1. Tuning Frequency (100Hz, Hex)

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2. Orbital Position
3. Polarization
4. Modulation
5. FEC Inner
6. Symbol Rate (100Hz, Hex) - the symbol rate

Configuring Cable Delivery Type

To configure for cable delivery, select:

1. Frequency (100Hz, Hex)
2. FEC Inner
3. FEC Outer
4. Modulation
5. Symbol Rate (100Hz, Hex)

Configuring Terrestrial Delivery Type

To configure for terrestrial delivery:

1. Center Frequency (10Hz, Dec)
2. Constellation
3. Code Rate HP
4. Guard Interval
5. Other Frequency
6. Time Slicing
7. Bandwidth
8. Hierarchy
9. Code Rate LP
10. Transmission Mode
11. Priority
12. MPE-FEC

Configuring Logical Channel Number (LCN) Type

To configure LCN (0x83), the list of all existing services appears and you can configure the following:

- checkVisible - Check to include service in the descriptor.
- LCN - Enter the logical channel number. LCN value should be unique for the transport.

Regenerating DVB

ProStream 1000 version 4.10 and up can regenerate the Event Information Table (EIT) at the output. To regenerate, ProStream 1000 parses the EIT at the input and draws the relevant events according to the services included in the output TS.

Table 4–6: EIT Regeneration Specification

Specification	Explanation
EIT PID	0x12

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Table 4–6: EIT Regeneration Specification

Specification	Explanation
Table ID	0x4E - for current/next events 0x50 - 0x5F - for scheduled events
Parsing	Up to 500 services Average of 165 events per service
Output	Up to 128 services
ProStream	ProStream 4.10 and up

Configuring EIT Regeneration

NOTE: Configuration applies to the output only.

To configure EIT Regeneration:

1. Open the Web client of the device.
2. Select the **Stream Config** tab.
3. Select the required TS.
4. Select the **Tables** tab.
5. In **Regeneration Mode**, select **DVB**.
6. In Output, browse to the required service and select it.
7. Select the **DVB** tab.

   The **DVB** tab appears only once you select an output TS > **Tables** and define DVB as the **Regeneration Mode**.
8. Select **Regen Tables**.
9. To define the input to be parsed for EIT regeneration, open the **Input TS** list and select the TS that includes the input service.
10. In **Input Service**, enter the input service.
11. Click **Apply**.
12. Select the **Events** tab to view the event details.

Regenerating PSIP Tables

The Program and System Information Protocol (PSIP) standard is an extension of the MPEG2 encoding standards. PSIP is a collection of tables designed to operate within every transport stream for terrestrial broadcast of digital television. The purpose of PSIP is to describe information at system and event levels for all services carried in a particular TS. Additionally, information for analog channels as well as digital channels from other TSs can be incorporated.

PSIP includes the following tables:

- STT (System Time Table) - Provides time reference
- MGT (Master Guide Table) - Lists the PIDs of each of the tables
- VCT - lists all virtual channels included in the TS. VCT may refer to either of the following:
- TVCT (Terrestrial Virtual Channel Table)

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- CVCT (Cable Virtual Channel Table)
- EIT (Event Information Table) - Provides information about events planned on the virtual channels
- ETT (Extended Text Table) Optional - Detailed information about the planned events

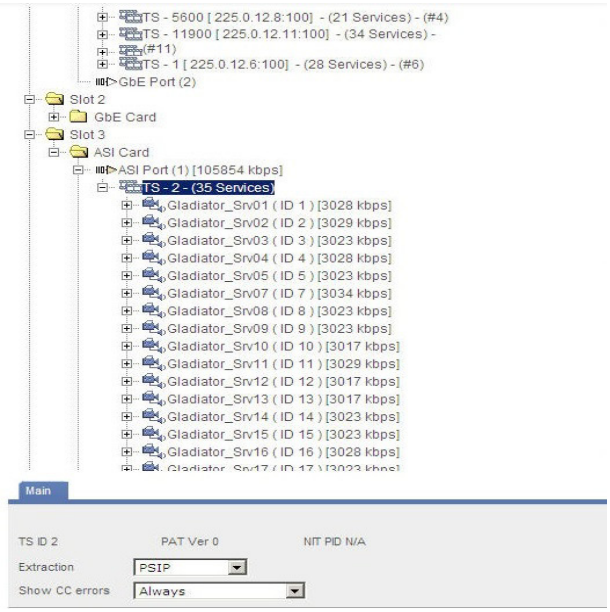
Regenerating includes the following stages:

- PSIP extraction in the input
- Configuring the output TS and PSIP regeneration
- Associating required services to the regenerated PSIP tables

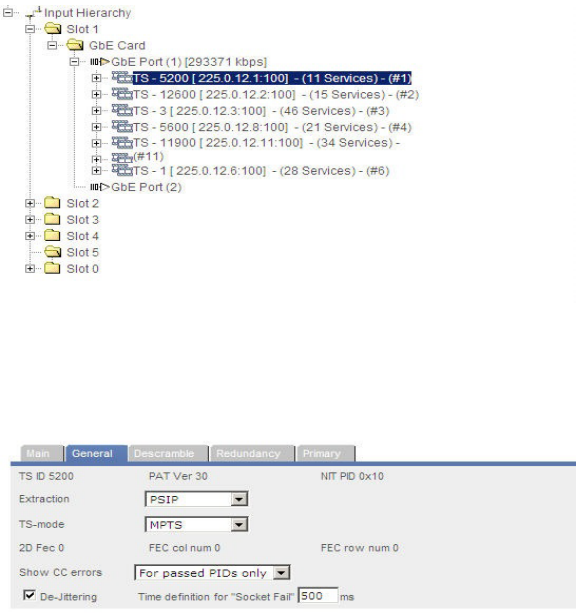
To extract PSIP tables:

1. In the Input section, select the required socket.
2. For TS input over a GbE port, select the **General** tab.

   For TS input over an ASI port, select the **Main** tab.



TS input over an ASI port



TS input over a GbE port

3. Open the **Extraction** list and select PSIP.
4. Click **Apply**.

To regenerate PSIP tables at the output:

1. In the Output section, select the required output TS.
2. Select the **Tables** tab.

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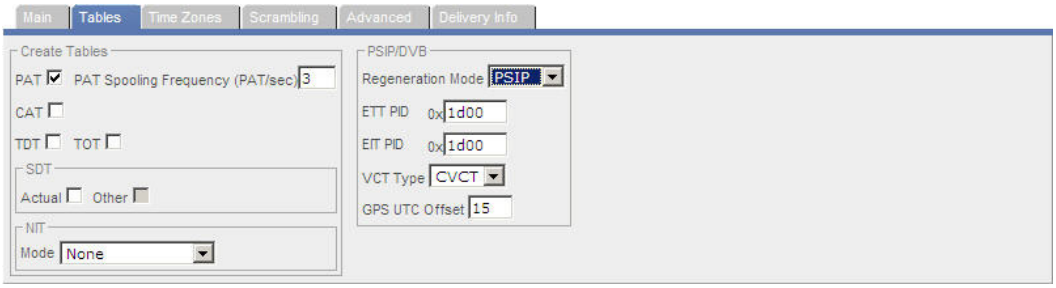
3. In **PSIP/DVB**, open the **Regeneration Mode** list and select **PSIP**.

   Additional options appear:



4. In **ETT PID** - Enter the required PID for ETT.
5. In **EIT PID**- Enter the required PID for EIT.
6. In **VCT Type** - Select either CVCT or TCVT.
7. In **GPS UTC Offset** - Enter the required offset to synchronize between GPS and UTC time.

NOTE: The default offset time due to SDT is 15 seconds.

To associate service(s) with the PSIP tables:

1. In the Output section, select the required output service.
2. Select the **PISIP** tab.

   The **PSIP** tab appears only once you select an output TS > **Tables** and define PSIP as the **Regeneration Mode**.
3. In **PSIP** tab, select **Regenerate Tables**.
4. In **Input TS**, select the input TS that inputs the PSIP tables.
5. In **Input Service**, enter the ID of the input service.
6. To override the service name, select **Service Name Override**.
7. If the broadcast provider has changed the channel number, focus on the **VCT** section.
8. To allow overriding of the input channel number, select **Enable Override** and enter the required major and minor channel numbers.

TS Mirroring

This feature enables you to duplicate an output TS for monitoring purposes. The device duplicates an output TS from any interface (IP, ASI) to any other TS over any interface. This feature supports all the functionality of the mirrored TS such as rate shaping, scrambling, RSS, tables generation, common, PID range or DToIP. You can configure the mirrored TS to be always clear.

NOTE: For mirroring to work, the mirroring TS must be clear of any configuration and provisioning.

To enable TS mirroring, do the following:

1. In **Output**, select the required TS.
2. Open all the tabs to verify the following:
   - No configuration is defined. For example, in **Tables**, no table is selected to be generated.
   - No content is provisioned to the mirroring TS.
3. Select the **Advanced** tab.
4. Open the **Mirror Of** list and select the required TS.

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The **Mirror Of** list is populated with the provisioned output TSs.

5. To have a clear TS at all times, select **Mirror Force Clear**.

Provisioning/Multiplexing Stream Content

When provisioning/multiplexing, you route a specific input (service/PID) to a specific output (service/PID). You can use the Input section (when you read input information from the input ports) and move services or PIDs from the Input section to the Output section and then provision them. On the other hand, you can use the New Service, New PID, and PID Range buttons to enter service/PID parameters and provision them. To provision a Reference Service, see *Reference Service*.

An input service is provisioned to an output transport stream only. An input PID is provisioned to an output service or transferred as an independent PID (ghost PID).

To provision using the Input section:

1. In the **Input** section, select an input component from a service level and below.

   The **Input Properties** section displays important information about the selected component.
2. In the **Output** section, select an appropriate output component.
3. Click **Add to Output**.

   The **Output** section is immediately updated and you can define the output properties of the service or PID.

NOTE: The ECM PID icon displayed in the input section under the service indicates a CA descriptor only. An ECM PID is displayed in the input section as a ghost PID. To pass the ECM PID to the output, select it and transfer it to the output section using the multiplexing buttons.

To delete an output component:

1. In the **Output** section, select a component.
2. Click **Remove from Output**.

   The **Output** section is immediately updated.

Provisioning/Multiplexing a Service

When provisioning a service, you can change its service ID, name, PMT PID and PID. In addition, you may add to a service a Reference Service as explained *Reference Service*.

To provision a service from Input:

1. In the **Input** section, select a service.
2. In the **Output** section, select a TS.
3. Click **Add to Output**.

   The service with its current configuration appears in the Output section and you may define its output properties.

To provision a service from Output:

1. In the **Output** section, select an output component from a TS level and below.

   If you select a PID, a new service is added to the parent TS.
2. Click **New Service**.

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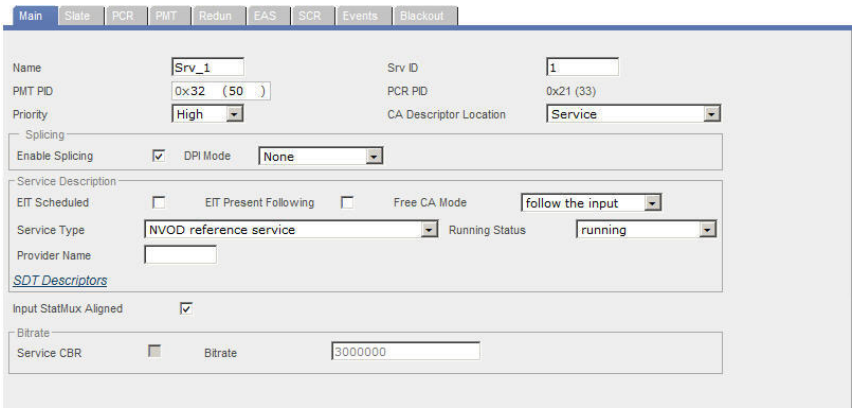
The **Output** Section is immediately updated. You can define the service input and output parameters.

Defining General Service Parameters

1. In the **Output** section, select a service.

   The **Stream Config** page is immediately updated. The following figure refers to New Service versus New Reference Service. For more information, see *Reference Service*.



2. Type in the required information in the following fields:
   - Name - Type in the service name, for example CNN, NBA.
   - Service ID - Service identification number at output port.
   - PMT PID - The PID over which the service's PMT (Program Map Table) is transmitted.
   - PCR PID - Relevant to New Service only. The PID over which the service's PCR (Program Clock Reference) is transmitted.
   - Priority - In Priority, define the priority for dropping services in case of overflow. Services defined as Low are the first ones to be dropped and services with High priority are the last ones to be dropped. The available priorities are as follows: High, Normal, Medium, Low.
   - ACE Transcoding - Select to allocate a transcoding engine for this service. If all transcoding engines are occupied, an alarm is raised when sending to the device. To optimize transcoding performance, click the Alloc Transcoding button.
   - CA Desc Location - Select one of the following:
     - Service
     - PID
     - Both
3. In the **Service Description** section, define the following SDT related parameters:
   - Configure the Service Description parameters only if the SDT table is selected on the Output TS > Tables tab. See *Provisioning the Output TS*.
   - EIT Scheduled - When selected, indicates that EIT schedule information for the service is present in the current TS.
   - EIT Present Following - When selected, indicates that EIT schedule information/following for the service is present in the current TS.
   - Free CA Mode - When selected, indicates that at least one component of the service is scrambled.

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- Service Type - Indicates the type of the service as defined in the DVB standard. It allows the service provider to describe the nature of the service, such as broadcast television, on-demand television, broadcast radio, data broadcast etc'.
- Running Status - Indicates the status of the service:
- Undefined
  - Not running
  - Starts in a few seconds
  - Pausing
  - Running
- Provider Name - Enter the name of the service provider as defined by the DVB standard.
- SDT Descriptors - Click to add an SDT descriptor as defined by the standard.

Configuring a Service Within a Stat-Mux Pool

To support splicing of services within a stat-mux pool, select the option **Input StatMux Aligned**. This option allows you to set the delay of the services in a statMux pool.

- Selecting this option for a service that is not splice enabled sets its delay to 1.5 seconds.
- Selecting this option for a service that is splice enabled forces its delay to 1.5 seconds.
- If you do not select this option for a service that is splice enabled, its delay shifts between 1.0 to 2.0 seconds.

Defining Slate (Static Apology Message) Parameters

When a broadcast of TV service is disrupted, the Slate feature enables you to quickly inform subscribers of efforts to restore the service. The Slate feature allows you to configure for any service an alternative or backup input feed or source that is enabled on the output upon disruption of the primary feed.

Table 4–7: Slate Specifications

Specification	Explanation
Total number of Slate feeds	Up to five per device
Video format of Slate feed	Any of the following presented in MPEG transport packets: ■ SD MPEG2 ■ SD AVC ■ HD MPEG2 ■ HD AVC ■ AC3 2.0 ■ AAC 2.0 iK Note: Slate feed format should match that of the primary feed
Bitrate of Slate feed	CBR only Note: The bitrate of the alternative feed is not greater than the bitrate of the primary feed(s)
Interface	Any input to any output

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Table 4–7: Slate Specifications

Specification	Explanation
Slate activation modes	The following modes are supported: Manual - you initiate the switch from the primary feed to the slate feed Automatic - device initiates the switch based on predefined triggers
Slate Triggers	See *Slate Mode*.

To configure Slate feed:

1. In the **Output** section, select a service.
2. Select the **Slate** tab.
3. Select **Enable Slate**.
4. Open the **Slate Mode** list and select a mode. For details on the modes, see Table 4-9 below.
5. Open the **Slate TS** list and select the input TS that includes the slate.
6. In **Service ID** enter the Slate service ID.

The following table shows Slate modes and their characteristics.

Table 4–8: Slate Mode

Option	Explanation
Auto	The Slate switch is performed automatically according to pre-defined triggers: ■ Lost of the Video PID - the Video PID drops to Zero bit-rate ■ Lost of input on the Encoders - Harmonic encoders only. The encoder stops streaming video traffic upon loss of input signal (configurable for every video PID). ProStream1000 detects a zero bit-rate at the input video. When switching to the alternative feed, ProStream remaps the components of the alternative feeds PIDs (Video, Audio) to the main channel component PIDs to ensure signal continuity on the output.
Manual	The user initiates the Slate switch
Manual Revert	The user initiates the revert

Setting PCR PID

A service may carry a PCR PID. A PCR PID can outflow according to one of the following options:

- Carried over one of the service's PIDs
- Carried over a reference service - only in case a reference service is configured
- Carried over any of the incoming PIDs
- A generated PID - PCR PID generated by the device and no input indication is required.
- No ES - the PCR PID is out flowing as an independent PID

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To set a PCR PID:

1. In the **Output** section, select a service.
2. Select the **PCR** tab.
3. Verify that **Generation Mode** is not selected. To generate a PCR PID, see *Generate PCR*.
4. Open the **Set** PCR **On** list and select one of the following:
   - Service PIDs: The **Set PCR On** list is automatically populated with the PIDs of the service.
   - Reference Service: Only if a reference service is configured.
   - New PID:
     - If Generation Mode is selected - The PCR PID is generated by the device and no input is required.
     - If Generation Mode is not selected - An input is required and the PCR PID is out flowing as an independent PID.
   - No PCR: Select to indicate that the service is outputted without PCR PID
5. Select the required instruction:
   - If the PCR is carried over the video/audio PIDs of the service, do the following:
     - Verify that **Generation Mode** is not selected.
     - Open the **Set PCR On** list and select the required PID of the service.
   - If the PCR is carried over the reference service, do the following:
     - Verify that **Generation Mode** is not selected.
     - Open the **Set PCR On** list and select the reference service.
   - If the PCR outflows independently, do the following:
     - Verify that **Generation Mode** is not selected.
     - Open the **Set PCR On** list and select **New PID...**.
     - In **PCR PID**, enter the ID of the PCR PID to outflow the PCR PID.
     - In **Input TS**, select the input TS that inputs the required PCR PID.
     - In **Input PID**, enter the required Input PID.

Generate PCR

ProStream 1000 can generate a PCR PID at the output regardless of the input PCR. As a result, each output service can have its own PCR PID with a new time baseline.

NOTE: When transcoding is required, the PCR should outflow over the video PID.

You can configure a PCR PID as follows:

- Each service generates its own PCR PID
- Common PCR - A single PCR PID is common to a few services

In both options, the PCR PID is output as a separate PID or over one of the ESs of the service. Usually the PCR PID is out-streamed over the video PID.

To generate PCR:

NOTE: This section does not apply to transcoded services.

1. Select the required service and click the PCR tab.
2. Select the **Generation Mode** box.

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3. In Set PCR On, select one of the following:
   - Select one of the PIDs of the service.
   - Select **New PID**. The **PCR PID** box appears.
4. In **PCR PID**, enter the required ID for the PCR PID.

NOTE: Continue with step 5, only to configure Common PCR.

5. For Common PCR, do the following:
   - In **PCR PID**, enter the required PID.
   - Select each of the required services and for the PID of the service to carry the PCR:
     - Select the PID.
     - Select the **Insert PCR** box.

NOTE: The Insert PCR box is enabled when a service is selected and in PCR tab you select Generation mode.

     - Select the **Advanced** tab.
     - In **Ref PCR PID**, enter the input PCR PID. The input PCR PID is a baseline for the generation of the PCR at the output.

Transcoding

To transcode the service, see *Transcoding an HD/SD Service*.

To re-encode the service, see *Re-encoding*.

Setting the PMT Generation Mode

To set the PMT Generation Mode:

1. Select the **PMT** tab.
2. Open the **PMT Generation Mode** list and select one of the following options:
   - Create - Default option. ProStream creates a new PMT for the service.
   - Pass - ProStream transfers the Input PMT to an output stream without changing or manipulating it. The PAT includes a reference to this PMT.
   - None - Components of the service are streamed without any PMT.
   - NMX - NMX sends the PMT to ProStream 1000.
   - Regenerate - ProStream regenerates PMT.
3. Select **Dynamic Service** - Specifies the device response when the input service is missing from the input PAT. Select this option if you know the input for this service is dynamic and you want the device to respond as follows if the service does not appear in the input stream:
   - The device does not raise any alarm regarding this service.
   - The service is removed from the PAT.
   - The device does not stream out the PMT of this service.
   - The output PSI are updated according to the changes in the corresponding input service.
   - If at least one ES disappears from the corresponding input service PMT (reference PMT), the ES is removed from the output PMT.
   - If the PCR PID disappears from the corresponding input service PMT (no PCR), then the PCR is removed from the output PMT.
   - Conditional PMT cannot work with a pre-encrypted service.

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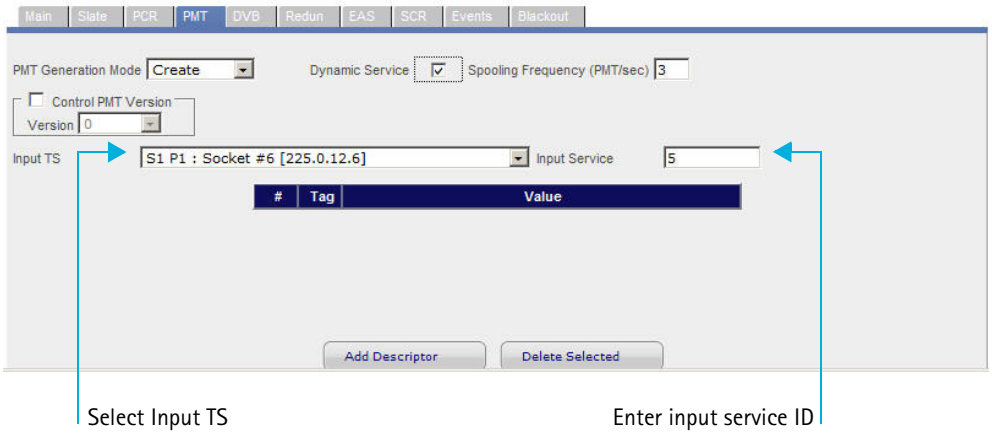
Once you define a service as a dynamic service by selecting **Dynamic Service**, configure the input TS and input service ID as shown in the following figure:



- Open the **Input TS** list and select the required input TS. The list is populated with the incoming TSs.
- In **Input Service**, enter the ID of the input service.

4. In **PMT Spooling Frequency (PMT/Sec)**, enter the required spooling per second.
5. Select **Control PMT Version**.

   By default, this option is not selected and the PMT version changes dynamically. The device automatically changes the PMT version on changes to the service.

   Selecting **Control PMT Version** enables the PMT Desired list. The PMT version remains as you have selected it in spite of service changes. Only a manual increment of the PMT version is available.

NOTE: If **Static** is selected in **PMT Version Control**, and you select the required PMT version, the version does not change upon changes to the service and you need to manually increment the PMT version.

Adding a Descriptor

To add a descriptor to the PMT:

1. Select the required service.
2. Select the **PMT** tab.
3. Click **Add Descriptor**.
4. Open the Descriptor Tag list and select the required descriptor. See *Table 4–9*.

Table 4–9: Descriptors in Descriptor Tag List

Sections of List	Explanation
Pre-defined descriptors	This section is marked by a blue line. It Includes the following four descriptors that appear above the blue line: ■ Registration descriptor ■ Language descriptor ■ Platform descriptor ■ Integrated signaling descriptor

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Table 4–9: Descriptors in Descriptor Tag List

Sections of List	Explanation
Descriptors	This section includes descriptors that you need to define by entering the descriptor details in hexadecimal. See *Standard ES Types and Descriptors*.
Other	This section enables you to add and define required descriptors that are not included in the list. Enter the descriptor details (descriptor type and value) according to the standard.

Defining Service Redundancy

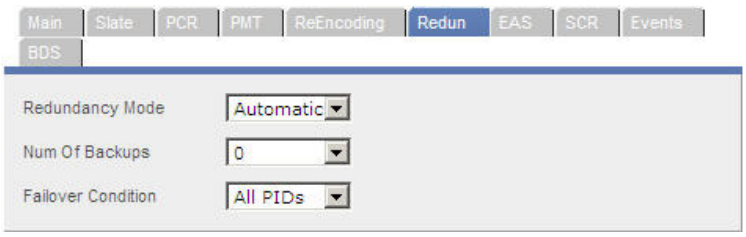
The program redundancy switch has a unique triggering mechanism. The redundancy switch is triggered by a program underflow and not by an alarm as with other redundancy methods. The related alarms only indicate that a redundancy switch has taken place.

You can configure the triggering condition by defining when to activate the redundancy switch:

- Program underflow
- Program PID underflow

To define redundancy parameters:

1. Select the **Redundancy** tab.
2. To set the redundancy mode, open the **Redundancy Mode** list and select one of the following options:
   - None - Program redundancy is inactivated
   - Manual - User initiates the program redundancy switch
   - Automatic - Program redundancy switch occurs automatically according to predefined triggers. There is no revert.
   - Manual Revert - Program redundancy switch occurs automatically according to predefined triggers. However, switching back to the primary program, when fixed, is performed manually. See *Reverting Manually*.
   - Automatic Revert - Program redundancy switch occurs automatically according to predefined triggers. Switching back to the primary program, when fixed, is automatic.
3. To define the number of backups, open the **Num of Backups** list and select the required number between 0-3.
4. Applies to Automatic mode only. To define a redundancy trigger, open the **Failover Condition** list and select either of the following:



   - Any PID - Redundancy switch takes place upon underflow of any of the service PIDs.
   - All PIDs - Redundancy switch takes place upon underflow of all of the service PIDs, or if a video PID or PCR PID is missing.

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NOTE: When selecting a PID of the service, you can configure in **Properties** the backup PID.

Reverting Manually

To enable manual revert:

1. Select the **Redundancy** tab.
2. Open the **Redundancy Mode** list and select **Manual**.
3. Open the **Active Source** list and select **Primary**.
4. Click **Done** and **Apply**.

Setting EAS Parameters

Setting EAS parameters requires that you:

- Enable EAS for the output service
- Select the EAS service to outflow instead of the provisioned output service

To enable the EAS service to outflow:

1. In Output, select the required service.
2. Select the **EAS** tab.
3. To enable the EAS for the service, select **Enable EAS**.
4. To select the EAS service (channel) for this output service, open the list and select the required channel.

   Once this EAS is required, the EAS is streamed out instead of the provisioned output service. See also *Configuring EAS Parameters*.

Configuring BISS

See *BISS Overview*.

Reference Service

The Reference Service feature enables an output service to automatically update according to changes detected on a specific input service. The input service is called “Reference Service”.

The Reference Service option enables ProStream to support two main applications:

- MHP - (Multi media Home Platform). This standard enables streaming data for interactive TV application.
- ASM (Automatic Service Mode) - You can choose to pass a service from the input to the output without specifying the exact PIDs of this service.

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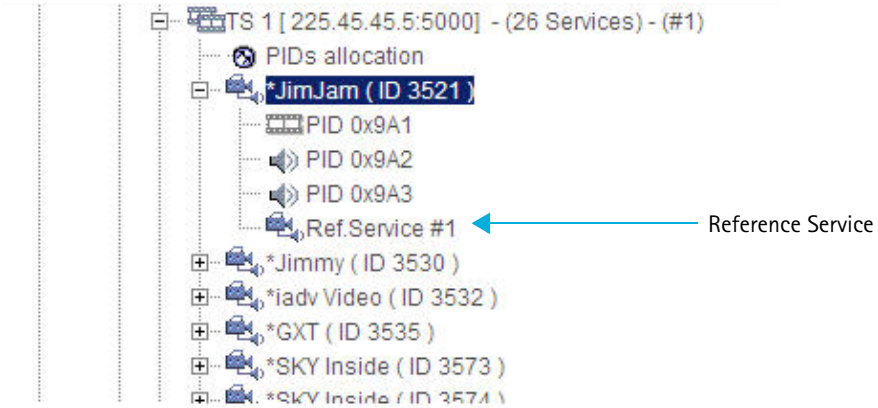
You can add a new reference service only to a service. The service becomes a parent service as the following picture shows:



ProStream dynamically aggregates the PIDs and descriptors of multimedia (audio/video) services with the data PIDs and descriptors of one or more MHP Services which are received from an MHP server that plays them out.

Any changes in the MHP services do not affect the stable streaming of the content of the parent service.

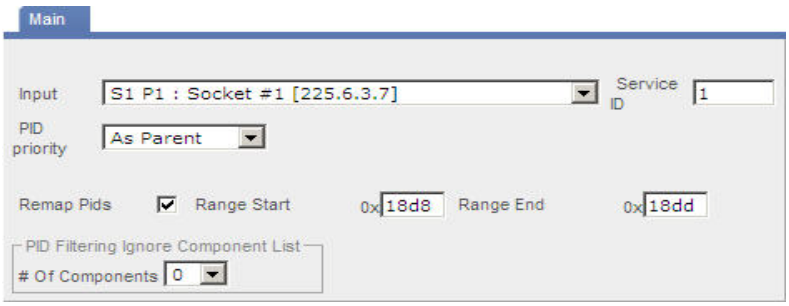
A service that includes reference services may also include explicitly defined ESs, just like any regular service. The PCR of such a service may be carried on an explicitly-defined ES, or on an ES that is part of the reference service. In the latter case, the reference service that includes the PCR stream is marked as Carry PCR. See also *Setting PCR PID*.

To provision a new reference service:

1. In the **Output** section, select a service to include a reference service.
2. Click **New Ref. Service**.

   A reference service is added to the parent service.
3. Select the Reference Service.

   The **Output Properties** section is updated accordingly:



4. Open the **Input** list and select the required input port.

   This is the port through which the reference service is streamed into the device.
5. In the **Service ID** box, type the ID of the required input service.

   This is the ID of the reference service.
6. In **PID Priority**, define the priority for dropping PIDs in case of overflow.

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PIDs defined as Low are the first ones to be dropped and PIDs with High priority are the last ones to be dropped. The available priorities are:

- As Parent
- High
- Normal
- Medium
- Low

7. If required, select **Remap PIDs**. It enables you to remap the PIDs of the reference service and to set the PID range.
   - Select **Remap PID.**
   - In **Range Start** and **Range End**, enter the first and last PID of the PIDs range, respectively.

NOTE: To maintain the PIDs as in the input, keep the Remap PID option disabled. The **Range Start** and **Range End** boxes will not appear.

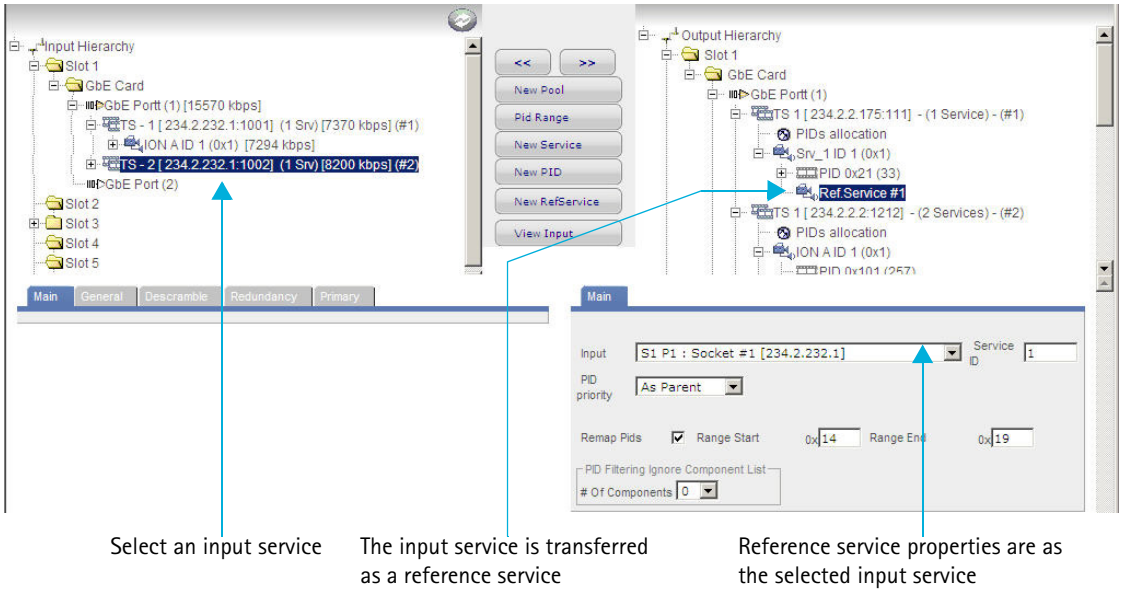
8. **PID Filtering** - In **PID Filtering** enter the component descriptor to be ignored. You can indicate up to five components to be ignored.

   See also, *PID Advanced Options*.

To provision a reference service from the input:

1. In the **Output** section, select a service to include a reference service.
2. In the **Input** section, select a service to be provisioned as a reference service.
3. Click **Add to Output**.

   The input service appears as a reference service of the selected output service.



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Provisioning/Multiplexing PIDs

This section describes how to provision PIDs. You can add a single PID or a range of PIDs.

To provision PIDs from Input:

Do either of the following procedures:

1. In **Input**, select the PID you want to move.
2. In **Output**, select a service or a PID in a service, or in case of a ghost PID, select a TS.
3. Click **Add to Output**.

   The Output section is immediately updated. You continue by defining the PID output parameters.

To provision PIDs from Output:

1. In **Output**, select a service or a PID in a service, or in the case of a ghost PID, select a TS.
2. Click **New PID**.

   A new PID appears in the Output section with a default value. Continue by defining its input and output parameters.

To provision a range of PIDs:

1. In Input, select the required incoming TS and in Output, select the required output TS.
2. Click **PID Range**.
3. In the message that appears, click **OK**.

   A new PID range appears in the Output section with a default value:0x0 - 0x1FFF.

   This value indicates a range that includes all the PIDs of the input TS. If you intend to provision all of the PIDs, verify that under TS > **Tables**, none of the tables are selected to prevent table override. However, you can configure the required PID range as instructed below.
4. Select the PID Range.
5. In **Input**, select the required Input port and socket.
6. To define the PID range, enter in **Start PID** and in **End PID** the first PID of the range and the last PID, respectively.
7. To remap, enter in **Start Remap PID** the first PID.

   The last remap PID is automatically calculated once you click out of the **Start Remap PID** box.

Defining PID Parameters

You can configure output PID ID in either Hex or Dec. Once you enter the ID in Hex automatically the value in Dec is updated and vice versa.

The following table describes remux mode parameters.

Table 4-10: Remux Mode Parameters

Remux Mode	Configuration
PID	In PID, enter the required input PID
Component	Component ID, enter the required component ID
ES Type	In ES Type, enter the required ES type. If it is an audio PID, select in Language the required language.

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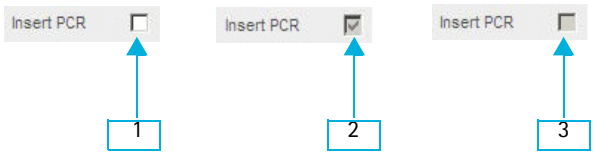
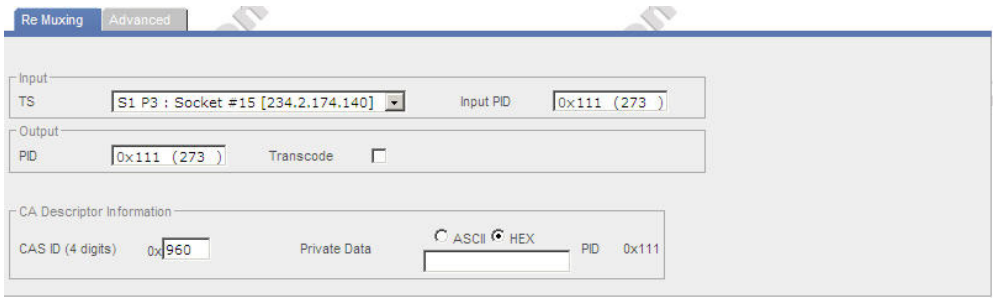
To define PID parameters:

1. Select the required output PID.
2. In Remux Mode, select one of the following options:
   - PID - Enables you to multiplex a PID that is identified according to the input TS, service and PID.
   - Component - Allows you to multiplex a PID that is identified according to the input TS, service and component. That is, one of the component descriptors has the indicated component ID.
   - ES Type - Enables you to multiplex a PID that is identified according to the input TS, service and ES type. If the ES is an audio PID, you can select the required language.
3. In **Input**, select the required components as follows:
   a. TS - Open the TS list and select the required TS.
   b. Service ID - Enter the required input service ID
   c. Fields according to Remux mode. See *Table 4-10*.
4. In the Output section, do the following:
   - PID - Enter the ID of the output PID. You can enter the PID ID either in hex or in dec. If you enter PID ID in hex, the corresponding value in dec automatically appears and vice versa.
   - ES Type - Enter the ES type of the output PID.
   - Insert PCR - Select to indicate whether the PID carries the PCR PID. This box status appears in one of the following modes:



   - 1 - Under service, **Generation Mode** is enabled and you can configure the PID to carry the PCR.
   - 2 - PCR configuration follows the input.
   - 3 - PCR configuration is disabled for this PID.

5. For a video PID in a transcoded service, select the Transcoding tab. See *Video Transcoding*.
6. For an ECM PID, focus on the **CAS Descriptor Information** section:



   - In **CAS ID (4 Digits)**, enter the required ID
   - In **Private Data**, enter a string of up to 100 bytes that is added to the CA descriptor. You can enter it either in ASCII or in Hex by selecting either **ASCII** or **HEX**.

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7. For advanced configuration, click **Advanced Configuration**.
8. For adding a descriptor, select **Descriptor** tab.

PID Advanced Options

To enable a PID's Advanced options:

1. Select the required output PID.
2. Select the **Advanced** tab.
3. Ref PCR PID - Indicates the PCR PID as defined in *Setting PCR PID*.
4. PID Priority - Defines the priority for dropping PIDs in case of overflow. PIDs defined as Low are the first ones to be dropped and PIDs with High priority are the last ones to be dropped. The available priorities are as follows:
   - As Parent - Either TS or service, according to the parent stream.
   - High
   - Normal
   - Medium
   - Low
5. CC Restamping - Select the CC Restamping box to enable this option.
6. PID Presence Detection - Options are:
   - Disabled
   - Enabled (Always)
   - Enabled (When input is valid) - default

   When either of the Enabled options is selected, the alarm *PID Missing* is raised when PIDs are missing.
7. In the Tracking Input Descriptors section:
   - Enable Tracking - Select to track changes in input of the descriptor and to allow the descriptor to move from input to output. Once you select this option, you can select PIDs to be filtered.
   - Input Service ID - Enter the input service ID that carries the PID you need to enable tracking and/or filter its descriptors.
   - Filter CA Descriptor - Select to remove the input CA descriptor from the output PID of the service.
   - Filter Stream ID Descriptor - Select to remove the input Stream ID descriptor from the output PID of the service.

   To filter descriptors in TS level, see *Table 4–4, "TS over GbE Parameters," on page 57*.
8. **Bitrate Underflow Trigger for Redundancy** - By default this option is selected.
9. In **Min. Bitrate**, enter the minimum bitrate in bps. If the output bitrate is lower than the indicated minimum bitrate, a redundancy switch may take place. See *Table 3–14 on page 43*.
10. Scrambling - Open the list and select one of the following options:
    - Per Service/Transport No Override - Follows the scrambling configuration of the TS or service
    - Always Scramble - Even if the TS or service are not scrambled, the PID is scrambled as long as a fixed key or a CW is provided
    - Always Clear- Even if TS or service are scrambled, the PID is always clear.

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Configuring PID Descriptors

To configure a PID descriptor:

1. Select the required output PID.
2. Select the **Descriptors** tab.
3. To add a descriptor to the original PID, click **Add Descriptor**.
4. For further instructions, see *Adding a Descriptor*.

NOTE: The configured CA descriptors is automatically added when creating an ECM PID.

Adding Ghost PIDs to the TS

Ghost PIDs are independent Elementary Streams (ES) that are not associated with any service. The ghost PID configuration enables you to transfer and remap PIDs as well as relocate their destination. You may also remap Ghost PIDs to new PIDs as long as they do not conflict with previously configured components.

To add ghost PIDs to the TS:

1. Select an Output TS.
2. Select an Input PID or create a new PID by clicking **New PID**.
3. If you select an Input PID, click **Add to Output**.
4. Configure the PID in the **Output** section.

   For further information, refer to *Provisioning/Multiplexing PIDs*.

Adding an ECM PID

To add an ECM PID to the TS:

1. Select an Output TS.
2. Click **New ECM PID**.
3. Open the TS list to select the required input TS.
4. In Input PID, enter the required input PID.

   You can enter the Input PID ID in either Hex or Dec.
5. In Output, enter the required PID ID in Hex or Dec.
6. To configure advanced parameters, select the **Advanced** tab.
   - PID Priority - Define the priority for dropping PIDs in case of overflow. PIDs defined as Low are the first to be dropped and PIDs with High priority are the last to be dropped. The available priorities are as follows:
     - As Parent - Either TS or service, according to the parent stream.
     - High
     - Normal
     - Medium
     - Low
   - CC Restamping - Select the CC Restamping box to enable this option.
   - PID Presence Detection - Options are:
     - Disabled
     - Enabled (Always)
     - Enabled (When input is valid) - default

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When either of the Enabled options is selected, the alarm *PID Missing* is raised when PIDs are missing.

- Remove PCR - Select if you want to remove the PCR PID.
- Bitrate Underflow Trigger for Redundancy - By default, this option is selected.
- In Min. Bitrate, enter the minimum bitrate in bps. If the output bitrate is lower than the indicated minimum bitrate, a redundancy switch takes place. See *Table 3–14*.

Configuring the Output Port

The available output ports are as follows:

- ASI - Outputs one TS.
- GbE - Outputs up to 128 TSs.

Each output port has its own unique configuration parameters. The following section guides you on how to configure each output port.

Configuring an ASI Output Port

The ASI output port requires that you set the required bitrate and enable the output port.

To configure an ASI output port:

1. Select the required ASI out port.
2. To enable the ASI port, select the **Enable Port**.
3. In **Description**, enter a short description.
4. To duplicate the traffic that outflow via the port, select **Is Mirroring**.

NOTE: You can also configure TS Mirroring when configuring a TS. See *TS Mirroring*.

5. Open the SFN mode and select one of the following:
   - None
   - SFN
   - DSR - To work in DSR, see *Deterministic SFN Re-multiplexing*.
6. In **Bitrate (bps)**, type in the required bitrate (bits per second) of the TS.
7. To define packet size, select **Packet Size**.

Configuring a GbE Output Port

The configuration of a GbE output port includes the following:

- Enabling the port
- GbE port configuration
- GbE socket configuration

To configure a GbE port:

1. In the **Output** section, select the required GbE port.
2. Click **Port configuration** to set port parameters.
3. Click Socket Configuration, to set socket parameters.

   See *Configuring the Output Socket Parameters*.
4. Select **Enable Port**, to enable the output port.

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8VSB Modulation

ProStream version 5.91 and up supports 8VSB modulation cards that enable reception of ATSC terrestrial TV. See *Part Number - Custom slot.*

The following table lists the specifications of the 8VSB module.

Table 4–11: 8VSB Specifications

Parameter	Specifications
8VSB input card	Up to four per device
ATSC receiver modules (tuner)	Up to four per 8VSB input card
Capacity of input port	1 x MPTS
TS frequency	Up to 19.39Mbps
Packet size	188 bytes
Channels of ATSC receiver modules	2-59
Packet Error Rate threshold	0-12,892 packets per seconds
Signal Quality threshold	0.0-27.0dB

ProStream 1000 supports the following applications with 8VSB modules:

- 8SVB input streams transcoded and output over ASI/GbE output ports. See *Video Transcoding*
- 8SVB input streams multiplexed and output over ASI or GbE output ports with PCR generation at the output. See *Setting PCR PID*.

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Chapter 5
Re-encoding

Overview

Harmonic's ProStream 1000 with Mentor™ re-encoding technology is a dense MPEG-2 re-encoding platform, featuring 16 MPEG-2 standard definition (SD) decoders and 16 MPEG-2 SD CBR encoders.The Mentor re-encoding technology enables VBR to CBR or CBR to CBR bit-rate adjustments as well as format changing of pre-encoded MPEG-2 video streams, while maintaining high video quality.

The ProStream 1000 is ideal for cable operators in multiple applications:

- Delivering multiple switched broadcast services through their VOD infrastructure by converting existing VBR services to CBR with high video quality.
- Delivering second generation on-demand services such as Network PVR by re-encoding existing VBR services to CBR as well as managing GOP structures for simpler ingest into the video server infrastructure.

Re-encoding

When you need to re-encode a service, use the **Encoding** tab.

Table 5–1 describes the different re-encoding modes.

Table 5–1: Encoding Modes

Service CBR	Video CBR	Capped VBR
In **Service Rate (bps)**, enter the required constant bitrate of the output service in bits per second.	In **Video Rate (bps)**, enter the required bitrate of the output service in bits per second.	In **Minimum Service Rate (bps)**, enter the minimum bitrate of the output service in bits per second and in **Maximum Service Rate (bps)**, enter the maximum bitrate of the output service in bits per second.
In **Horizontal Resolution**, set the required number of horizontal lines for the picture.	In **Horizontal Resolution**, set the required number of horizontal lines for the picture.	In **Horizontal Resolution**, set the required number of horizontal lines for the picture.
		In **Video Quality**, select either of the following: CBR A number between 1 - 10 when 1 is the lowest and 10 is the highest.

To set re-encoding parameters:

1. In **Output**, select the required service.
2. Select the **ReEncoding** tab.
3. In **ReEncoding Mode**, select the re-coding mode. By default the re-coding mode is None. You can select one of the following modes:

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- None - Default option.
- Service CBR - Encoding the service with a constant bitrate
- Video CBR - Encoding the video with a constant bitrate
- Capped VBR - Output service is VBR with pre-defined maximum bitrate.

4. If the service is a spliceable service, select **Splice Enable**.
5. By default, user data is transmitted from input to output. To discard user data, select **Discard User Data**.
6. Do one of the following according to the selected Re-Encoding Mode:

NOTE: If **None** is selected, all Encoding parameters are disabled.

7. Under **GOP**, define the parameters described in *Table 5-2*:

Table 5-2: GOP Parameters

Option	Explanation
Output GOP	Select either of the following: ■ Follow Input GOP - Default option ■ Capped GOP - Define the maximum number of frames for inserting the I frame.
GOP Length (6-15)	Enabled only if you selected in **Output GOP** Capped GOP. Define the required GOP length that is the number of frames for inserting the I frame.
Closed GOP	Select either of the following: ■ Follow Input GOP - Default option ■ Closed GOP - There are no referenced pictures from the previous GOP at the current GOP boundary.
Closed GOP Frequency (0-10)	Enabled only if you selected **CBR** or **Capped VBR**. Define the required closed GOP length that is the number of frames, from 0 to 10, for inserting the I frame.

DiviTrackMX™

With DiviTrackMX™ statistical multiplexing technology, the ProStream 1000 delivers highly efficient VBR services without the need for any additional equipment. The ProStream 1000 with DiviTrackMX simplifies the traditional DTA architecture, which consists of separate systems for rate shaping and scrambling, by incorporating both functions within an ultra-compact 1-RU solution.

To create a Pool of Services:

1. In the **Stream Config** page, select the required output TS.
2. Click **New Pool**.

   A new Pool is added to the TS with a default bitrate of 38MHz.

To configure the Pool:

1. Select the required Pool.
2. In **Output Properties**, type the following:
   - Name - Type the pool name

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- Bitrate - Type the required pool bitrate.

3. To monitor the bitrate, click **Bitrate Monitoring** (for future use).
4. Provision the pool with services and configure the services in the pool as explained in *Configuring DiviTrackMX Services*.

Configuring DiviTrackMX Services

To configure DiviTrackMX services:

1. Select a service in the pool.
2. Select the **DTMX** tab.
3. Under **Stat-Mux Parameters**, define the following parameters:
   - Treatment list:
     - Rate Changing - Service in the pool is a VBR service and its bitrate may change according to the pool configuration and the DiviTrackMX statistical mechanism.
     - Pass Through - Bitrate of the service is the same as at the input. No changes are applied to the service bitrate.
   - Splice Enable: For future use.
   - Priority: The higher the priority, the more bitrate is allocated for that service. By default, priority is 5.
4. Under **Recoding Parameters**, define the following parameters:
   - Minimum Service Rate (bps) - Set the minimum bitrate of the output service in bits per second.
   - Maximum Service Rate (bps) - Set the maximum bitrate of the output service in bits per second.
   - Horizontal Resolution - Set the required number of horizontal lines for the picture.
   - Discard User Data - By default, user data is transmitted from input to output. To discard user data, select **Discard User Data**.
   - Output GOP - Select either of the following:
     - Follow Input GOP - Default option
     - Capped GOP - Define the maximum number of frames for inserting the I frame.
   - GOP Length (6-15) - Enabled only if you selected in Output GOP Capped GOP. Define the required GOP length that is the number of frames for inserting the I frame.
   - Closed GOP - Select either of the following:
     - Follow Input GOP - Default option
     - Closed GOP - Frames from current GOP cannot reference I frames from previous GOP.
   - Closed GOP Frequency (0-10) - Enabled only if you selected CBR or Capped VBR. Define the required closed GOP length that is the number of frames, from 0 to 10, for inserting the I frame.
   - Video Quality - Applicable for Capped VBR only. Select either of the following:
     - CBR
     - A number between 1 - 10 when 1 is the lowest and 10 is the highest.

NOTE: BOS tab applies to Direct TV only. This manual does not cover these specific features.

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Chapter 6
Broadcast Transcoding

Overview

This version of ProStream 1000 with ACE™ (Agile Compression Engine) enables you to transcode video and audio PIDs. This version of ProStream 1000 supports both broadcast and multiscreen output streams simultaneously.

Video Transcoding

This version of ProStream 1000 allows to transcode up to 20 HD or up to 60 SD services. The device transcodes services as follows:

- High Definition (HD) MPEG2/H.264 services to HD MPEG2/H.264 services.
- Standard Definition (SD) MPEG2/H.264 services to SD MPEG2/H.264 services.
- Downconversion HD MPEG2/H.264 services to SD MPEG2/H264 services.
- Microsoft Picture in Picture (PIP) - HD/SD MPEG2/H.264 services to PIP H.264 services. Microsoft PIP is a low resolution service that complies with Microsoft PIP specifications.

Table 6–1: Possible Combinations of HD and SD Services per Transcoding Card

SD	HD/Downconversion (HD to SD)
15 services	None
12 services	1 service
9 services	2 services
6 services	3 services
3 services	4 services
None	5 services

Video Transcoding Procedure

You can transcode either of the following:

- HD/SD service
- PIP service

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Transcoding an HD/SD Service

The following section instructs you on how to transcode an HD/SD service using the Web client of the ProStream 1000 transcoder. The following table lists the required configuration to transcode the video PID of a service.

Table 6–2: Transcoding Required Configuration

Feature	Input Stream	Output Stream	Explanation
Video Format	HD/SD	HD/SD	Supports: ■ High Definition (HD) ■ Standard Definition (SD) ■ Downconversion from HD to SD
Stream Type	H.264/ MPEG2	H.264/MPEG2	Inputs H.264/MPEG2 and transcodes to H.264/MPEG2 In downcoversion, output is MPEG2 only.
Resolution	N/A	Horizontal Resolution: ■ HD ❑ 720p - supports 1280x720, 960x720 Coverts any to any of the supported types. ❑ 1080i - supports 1920x1080, 1440x1080, 1280x1080 Converts any to any of the supported types Horizontal Resolution supports both 50 and 60Hz Vertical Resolution - no conversion, follow the input ■ SD ❑ PAL 50Hz - supports 720/704/640/544/ 528/480/352 X 576 Converts any to any of the supported types ❑ NTSC 60Hz - supports 720/704/640/544/ 528/480/352 X480 Converts any to any of the supported types	■ HR - if input is 720p, transcodes any 720p supported type to any 720p supported. If input is 1080i, transcodes any 1080i supported type to any 1080i supported type ■ If input resolution changes, and: ❑ Output resolution is Follow the Input, the output resolution changes accordingly without service interruption assuming that no gaps are created at the input. ❑ Output resolution is configured to a certain resolution, the output resolution remain as output configured resolution. ■ Downconversion - any supported input HD resolution to any supported SD output resolution. Default output resolution: 720p. ■ VR - Follow input only. Unsupported VR conversion. Note: Downcoversion - Output Vertical resolution is automatically set according to the input frame rate: 480 - In 60hz 576 - In 50hz

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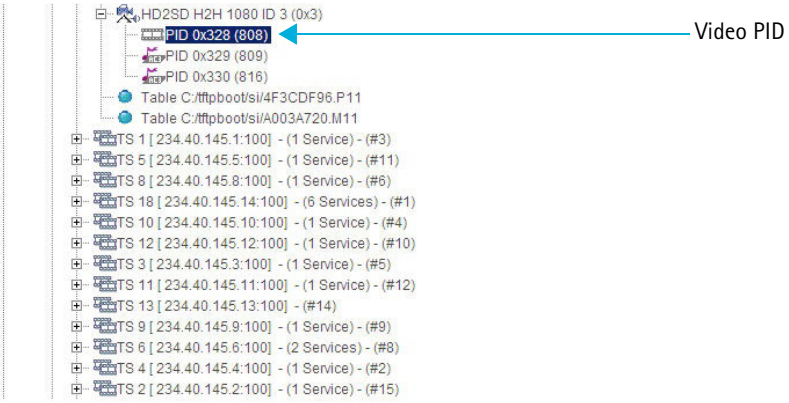
Table 6–2: Transcoding Required Configuration

Feature	Input Stream	Output Stream	Explanation
Aspect Ratio	N/A	Follow input 16:9 4:3	Allows to match picture to type of screen, standard or wide screen.
bitrate	N/A	CBR VBR	See *Defining Output Bitrate of a Transcoded Service*.
User Data	N/A	AFD Closed caption Other data	Allows to select which user data to output with the video PID In Downconversion, define Video Scaling.
GOP	N/A	GOP	Allows to define GOP related parameters
PCR PID	Any PID	Video PID	Input - Any PID may input the PCR PID. Output - Only video PID may transmit the PCR PID

The transcoding parameters are grouped in the **Video Transcoding** tab. For PCR configuration, see *Setting PCR PID*.

To transcode a Video PID:

1. In the **Output** section, select the required service.
2. Double-click the service node to view its PIDs.
3. To transcode its video PID, select the PID.
4. In the **ReMuxing** tab, select **Transcode**.



5. Select the **Video Transcoding** tab.
6. To select the input video format, click the **Video Format** drop-down list and select one of the following:
   - SD to SD
   - HD to HD
   - HD to SD
   - Any to PIP. See *Transcoding a PIP Service*.

To select the stream types:

1. Open the **Input Stream Type** list and select the required type: H.264 or MPEG2.
2. Open the **Output Stream Type** list and select the required type: H.264 or MPEG2.

To define the output resolution:

1. Open the **Output Resolution** list and select one of the following:
   - N/A (follow source)
   - HD
   - SD
2. Open the **Profile** list and select one of the following:
   - MPEG2 - SD: main, HD: high
   - H.264 - SD: main/high, HD: main/high
3. To configure the required aspect ratio, click the **Aspect Ratio** drop-down list and select one of the following options according to its video format:
   - Follow the input - No changes to the aspect ratio.
   - 16:9 - (Letter Box) the international standard format of HDTV, non-HD digital television and analog wide-screen television.
   - 4:3 - (Center Cut) select for standard TV.
4. **Mctf** (Motion-Compensated Temporal Filtering) - Click the **Mctf** drop-down list and select the required level ranging from very weak to very strong. The default is Off.

NOTE: Mctf affects the video quality and reduces noise. If the service bitrate is low it is recommended to use strong Mctf. However, strong Mctf affects the sharpness of the picture.

5. **DVB AU Info** (DVB Access Unit Information) - Click the **DVB AU Info** list and select either **Yes** or **No**.
6. **PES Insert Rate** - When setting up for H264 set-top-boxes, open the **PES Insert Rate** and select either of the following:
   - Every Picture - Default option. PES packets are inserted per field.
   - Alternate - PES packets are inserted per frame.

NOTE: When output resolution is 720p, always use PES per frame.

7. MP2 Adaptive-PT:

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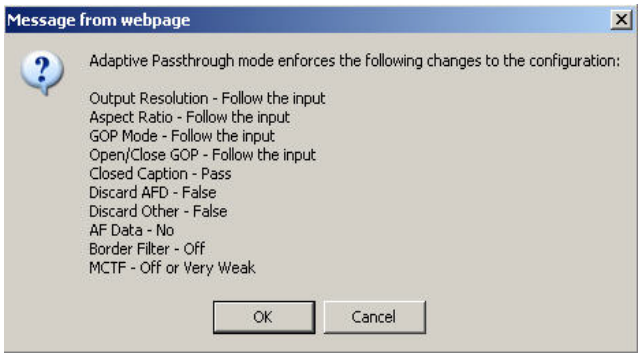
- In **MP2 Adaptive-PT**, select **Enable**. The following message appears.



- Click **OK**. The device automatically applies adaptive passthrough.

NOTE: This applies to PEG2-to-MPEG2 SD, HD, 50/60Hz, CBR/VBR input and output. When enabled, the device automatically enforces the required configuration. See also *Video Quality Enhancement*. When disabling MP2 Adaptive-PT, the enforced configuration is maintained, but the parameters are enabled and you need to change their values as required.

8. **EBP** (Encoder Boundary Point) - By default, this option is disabled. EBP applies to both Broadcast and Multiscreen modes. See *Table 6–3*.

Table 6–3: EBP Mode Options

EBP Mode	Broadcast	Multiscreen
Disabled	V	V
Every GOP	V	
Every Segment		V

NOTE: EBP is a signaling mechanism for creating fragments or segments from audio or video streams. It also can provide a timing field to indicate encoding time that can be used for synchronization purposes.t

To select the required EBP:

1. Open the EBP list:
2. In Multiscreen mode - Select either **Disable** or **Every Segment.**
3. In Broadcast mode - Select either **Disable** or **Every GOP**.

For advanced EBP configuration, see *Transcoding a PIP Service*.

To define the required output bitrate of the stream:

- In the **Bitrate** section, click the **Mode** drop-down list and select one of the following:
  - CBR
  - VBR

NOTE: You can configure the bitrate of the transcoded stream at service level. See *Service CBR: Configuring Bitrate of Transcoded Stream at Service Level*.

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To configure CBR:

- In **Rate (bps)**, enter the required output bitrate. See *Table 6–8*.

To configure VBR:

1. Open the **Pool** list and select the required pool.

   To create a pool, see *Creating a Pool*.

   Currently mixed pools (HD/SD, MPEG2/AVC) are not supported. See *Creating a Pool*.
2. In **Min Rate**, enter the minimum rate of the video PID.

   The total sum of minimum rates of streams in the pool must be smaller than pool rate.

   See *Table 6–7*.
3. In **Max Rate**, enter the maximum rate of the video PID.

   See *Table 6–7*.
4. Click **Pool...** to view pool information.

   See *Understanding the Pool Details Page*.

To manage user data at the output:

1. Focus on the **User Data** section:
2. Open the **Closed Caption** list and select one of the following options:
   - Pass - Passthrough any closed caption data present in the input stream.
   - Discard - Remove any closed caption data present in the input stream.
   - SCTE-20, ATSC A/53, SCTE-20 + ATSC A/53, ATSC A/72, NADBS - Closed caption data outflows in formats including dual-caption SCTE-20 + ATSC A/53. The closed caption data format depends on Video Format and Stream Type.
3. Select **Discard Other** to discard all user data except AFD and closed caption data.
4. Select **Discard AFD** (Active Format Definition) to discard data related to the aspect ratio of the image.
5. **Video Scaling** applies to downconversion, HD to SD only. If HD to SD, open the **Video Scaling** list and select one of the following options:
   - Force letter-box
   - Force center-cut
   - Follow AFD (fallback to letter-box) - Default value
   - Follow AFD (fallback to center-cut)
   - Squeeze to Anamorphic - Only if the aspect Ratio is 16:9
6. **Generate AFD if Input Missing**
   - Open the list.
   - Select one of the AFD Generation Options. See *Table 6-4*.
7. **Border Filter** applies to broadcast transcoding of SD to SD only. To enable, open the **Border Filter** list and select **On**. The transcoding engine removes the following VBI data in the video signal:
   - If input is 480i (NTSC), AMOL (Automated Measurement of Lineups) data is removed.
   - If input is 576i (PAL), WSS (Wide Screen Signaling) data is removed

     In both cases, the VBI data occupies the first active line of video per video field. The line suppressing functionality copies the video data from the second line of video (per field) into the first line of video (per field).

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NOTE: Border Filter is not supported if Adaptive Passthrough is selected.

Table 6-4: AFD Generation Options

Definition	Integer	Aspect Ratio
SD-> SD	1	4:3 full frame (1000)
	2	4:3 full frame (1001)
	3	16:9 letterbox, vertically centered (1010)
	4	14:9 letterbox, vertically centered (1011)
	5	4:3 full frame, alternative 14:9 center (1101)
	6	16:9 letterbox, alternative 14:9 center (1110)
	7	16:9 letterbox, alternative 4:3 center (1111)
HD-> HD	11	16:9 full frame (1000)
	12	4:3 pillarbox (1001)
	13	16:9 full frame (1010)
	14	14:9 pillarbox (1011)
	15	4:3 pillarbox, alternative 14:9 center (1101)
	16	16:9 full frame, alternative 14:9 center (1110)
	17	16:9 full frame, alternative 4:3 center (1111)

To configure GOP related parameters:

1. Open the **Mode** list.
2. Select one of the following options:
   - Follow the input - Default. The GOP mode is as in the input.
   - Fixed GOP - The number of frames for inserting the I frame and for inserting the reference frame (P frame) is fixed.
   - Variable - The number of frames for inserting the I frame changes. First it is as in the input but may change as required.
   - Capped - Defines the maximum number of frames for inserting the I frame. The number of frames should never exceed the value defined in **N frames**.
   - Fixed M - Defines a fixed number of frames for inserting a reference frame (P frame) no matter when the I frame is inserted.
   - To define the number of frames for inserting a P frame, in **M Frames**, select the required value. The following table shows the valid M frame values:
   - To define the maximum number of frames in the outgoing GOP, in **N frames**, enter the maximum number of frames for inserting the I frame in a range of 6-90.

NOTE: N must be a multiple of M.

3. Open the **Open/closed GOP** list and select either of the following:
   - Follow Input GOP - Default option

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- Closed GOP - Frames from current GOP cannot reference I frames from previous GOP.
- Open GOP - Frames from current GOP can reference I frames from a previous GOP.

4. To allocate an entire transcoding engine for a single broadcast SD service, click the **Advanced** option and select **Premium Channel**.

Table 6-5: Values of the M Frame

Output Stream	M Valid Values	M Default Values
MPEG2 (HD/SD)	1,2,3	3
H.264 SD H.264 HD1080i	1,2,4	4
H.264 HD 720p	1,2,4,8	8

Logo Insertion

The Logo Insertion feature places a small user-provided logo image over the input video. The image is static (non-animated) and it can have transparent and semi-transparent regions.

To configure Logo Insertion, focus on the Logo Insertion section:

1. Upload a logo file via the **Assets** tab.

   See *Uploading Logo Insertion Files*

2. To enable the **Logo Insertion** section, select **Logo Insertion**.
3. Open **Logo Name** and select the required logo file.
4. Open the **Position** list and select the required position for the logo: Top Left, Top Right, Bottom Left, Bottom Right.
5. In **Vertical Offset** and **Horizontal Offset**, select the required distance, respectively.
6. In **Transparency**, enter the required value, or move the slider.

DVB Subtitles (OSD)

DVB Subtitle Burn-in for Broadcast transcoded streams is supported for HD to HD, SD to SD and HD to SD.

You can enable this feature for each transcoded service.

Only a single language is supported per service and you can select the required language.

Only the burn-in of graphical objects (bitmaps) is supported, burn-in of text objects is not supported.

Configuring OSD

To configure OSD:

1. In the Transcoding tab, click **DVB Subtitles OSD**.
2. To enable, click **Enable DVB Subtitles OSD**.
3. **Source Selection** - select the input source:
   - PID - if selected enter in **PID** the required input PID.
   - Component - if selected, select in **Input Service ID** the required service and in **Component**, enter the required component.

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- Language - if selected, enter in **Input Service ID** the required service and in **Language**, select the required language.

4. **Sync Compensation (ms)** - Enables you to synchronize between the video stream and the subtitles in case of synchronization problem at the source. You can select the required synchronized compensation in milliseconds. The allowed range is between -1500 to 3000 ms.
5. **Page Timeout (sec)** - To avoid displaying obsolete subtitles, enter in Page Timeout the required period of time for displaying a subtitles page.

CBR During Ad

You can switch a transcoded VBR video stream inside a stat-Mux pool, to a CBR video stream during an ad avail as a result of SCTE-35 signaling. This feature allows ads with a bitrate that is smaller or equal to the configured CBR, to be spliced by a splicer that receives the network input from a ProStream device with transcoding capabilities (with ACE).

Configuring CBR During Ad

To configure CBR During Ad:

1. In the Transcoding tab, click **CBR During Ad**.
2. To enable, click **CBR During Ad**.

   You can enable this feature only if an SCTE-35 PID is provisioned.
3. **Bitrate (Mbps)** - Enter the required CBR for the video stream that applies during the splicing.
4. **Timeout (seconds)** - Select the period of time after which splicing is stopped and the video stream switches back to VBR. This parameter is used in case the avail is not indicated.

Transcoding a PIP Service

The following section instructs you on how to transcode a PIP service using the Web client of the ProStream 1000 transcoder. The following table lists the required configuration to allow the transcoding of the video PID of a PIP service.

Table 6–6: Required Configuration for Transcoding a PIP Service

Parameter	Specification	Explanation
Enabling PIP	Enable PIP	PIP configuration is allowed on the device
Output Codec	H.264	
Output Resolution	96 × 96 92 × 192 128 × 96 192 × 192 192 x144	
Video Bitrate	100 to 550 Kbps CBR only	
Frame Rate	50/60Hz	

Service affecting operations for both the main and PIP coupled services:

- Adding/Removing PIP from the main Service

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- Recovery from any error condition in main/PIP might result in service interruption to main/PIP.

NOTE: You cannot delete, disable and un-transcode a main service when a PIP service is coupled with it.

The transcoding parameters are grouped in the **Transcoding** tab. For PCR configuration, see *Setting PCR PID*.

To enable and transcode PIP services:

1. Log into the device.

   See *Logging into the Device*.
2. To enable PIP services on the device, select **Tools** > **Video Procession** and focus on the **ACE PIP** section.
3. Click the **PIP Enable** drop-down list and select **Enable**.
4. Click **Apply**.
5. In the **Output** section, select the required service to be transcoded.

   The stream is configured as transcoded in the **Main** tab of the service configuration.
6. Select the video PID.
7. Select the **Transcoding** tab.
8. To select the video format, open the **Video Format** list and select **Any to PIP**
9. To define the output resolution, click the **Output Resolution** drop-down list and select one of the following:
   - 96 × 96
   - 92 × 192
   - 128 × 96
   - 192x144
   - 192 × 192
10. Define the profile:
    - Open the **Main** list.
    - Select either **Main** or **Baseline**.
11. In **Rate**, enter the required output bitrate in bps of the video PID.

    See *Table 6–8*
12. To define the main service, do the following:
    - In the PIP section, click the **Main Service** drop-down list.
    - Select services that may be coupled with PIP services.

NOTE: Main and PIP services have the same input. Any input problem triggers an alarm on the main service.

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Defining Output Bitrate of a Transcoded Service

When the output service is a VBR service in a pool, configure it according to the following table:

Table 6–7: Bitrate of a VBR Output Service

VBR Output Service Type	Min Rate (Mbps)	Max Rate (Mbps)
SD MPEG2	0.5	8
HD MPEG2	2	18
SD H.264	0.5	8
HD H.264	1	18

When the output service is a CBR service, configure it according to the following table.

Table 6–8: Bitrate of a CBR Output Service

CBR Output Service Type	Min Rate (Mbps)	Max Rate (Mbps)
SD MPEG2	2	8
HD MPEG2	6	20
SD H.264	1	8
HD H.264	3	18
HD/SD PIP	0.1	0.55

PCR and Video Transcoding

- The PCR PID outflows over the video PID. To configure it, see *Setting PCR PID*.
- Reference PCR value is indicated for all PIDs of the service. (Select any service **PID** > **Advanced** tab.) Reference PCR indicates the PCR PID in the input. If, the input PCR PID changes, you need to manually change the Reference PCR PID for every PID of the transcoded service. Select the **PID** > **Advanced** tab.
- When transcoding a service, PCR Generation Mode is not selected in **Service** > **PCR** table, **Generation Mode**.

Transcoding Conventions

The following table lists the conventions for a transcoding service with CBR and VBR bitrates.

Table 6–9: Transcoding Conventions

Convention	Explanation
	Transcoded service
	Transcoded service in a pool

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Creating a Pool

To create a pool:

1. In the **Output** section, select **Output Hierarchy**.
2. Select the **DT Pool** tab.
3. To add a pool, click **Add Pool**.
4. Define pool parameters as follows:
   - Pool ID - Read only. A sequential order of the listed pool.
   - Pool Name - Enter a name for the pool.
   - Pool Bitrate - The default pool rate is 20bps. Enter the required pool rate in bps.

NOTE: When determining the bitrate of the pool, consider the transport bitrate and allow enough bitrate for additional PIDs that are included in the TS.

5. To view general pool information, click **Stream List**.

Understanding the Pool Details Page

The **Pool Details** page provides the following information:

- Pool ID - ID of the pool.
- Pool Name - Configured name of the pool.
- Pool Bitrate - Configured bitrate of the pool.
- Stream list - Table that shows the following parameters of pool streams:

Table 6–10: Parameters of Streams in a Pool

Parameter	Explanation
#	Sequential number of the stream
PID	The PID
Service Name	The name of the service that carries the video PID.
TS Out	Details of the output of the TS as follows: Slot: Port: Socket
Video Format	Input - HD/SD Output - HD/SD
Xcode Path	Transcoding Type: H-M - input H.264 to MPEG2 output M-M - input MPEG2 to MPEG2 output H-H - input H.264 to H.264 output
Min. Rate	The minimum rate of the stream
Max. Rate	The maximum rate of the stream

Removing a Pool

To remove a pool:

1. Select **Output Hierarchy** > **DT Pool** tab.

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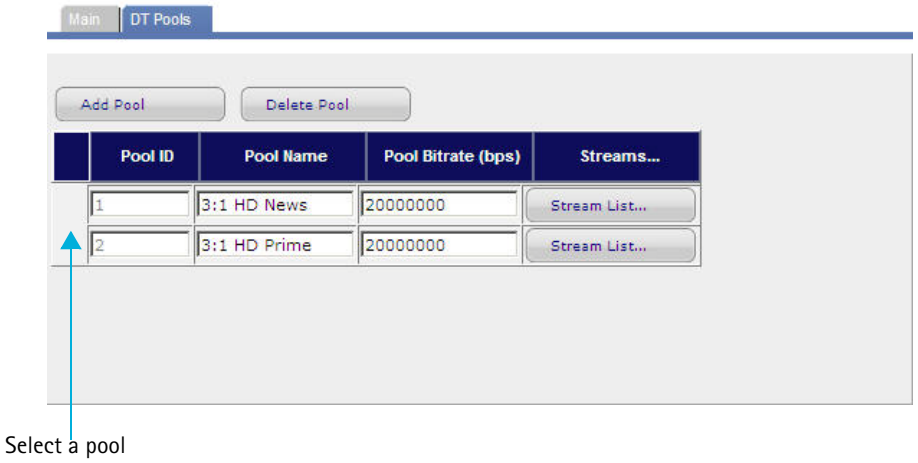
2. Select the required pool to be removed by clicking the left most column.



The selected pool record has a darker shade.

NOTE: You can select multiple pools by clicking the left-most column while pressing the <Ctrl> key.

3. Click **Delete Pool** to delete the selected pool.

Video Quality Enhancement

To improve the Video Quality (VQ), ProStream 1000 supports Adaptive Passthrough processing. This type of processing adoptively selects between the following modes to get better VQ:

- Full rate shaping
- Full passthrough - Input is passed as-is without transcoding. When the output stream bitrate is higher than the input stream bitrate, the device will mostly operate in full passthrough (very low input, VBV, may disable passthrough for a short period).
- Partial passthrough - Only B-frames are rate shaped. Partial passthrough engages when the output bitrate is slightly lower than input bitrate (i.e. small rate reduction ratios).

NOTE: Adaptive passthrough processing triggers when applicable and you cannot configure it.

Adaptive passthrough applies to the following:

- Video format - SD, HD
- Stream type - MPEG2-to-MPEG2
- Horizontal resolution - 50/60Hz

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- Bitrate - CBR/VBR input and output.

When adaptive pass-through is enabled, the following configuration is enforced:

- All applicable user configurations (Output Resolution, Aspect Ratio, GOP Mode, Open/Close GOP) are set to *Follow input*.
- User Data - Closed Caption is set to *Pass*.
  Discard AFD and Discard Other are grayed out.
- AF Data is set to *No*
- MCTF is set to *Off* or *Very Weak*
- Set-top box mode is set to *DVB*.

NOTE: When input bitrate is high, the adaptive passthrough feature might be disabled.

EBP Advanced Configuration

ProStream with ACE 5.2 and higher, supports Enhanced EBP Signaling. This feature allows to control the EBP section content.

EBP Information is constructed of 3 sections:

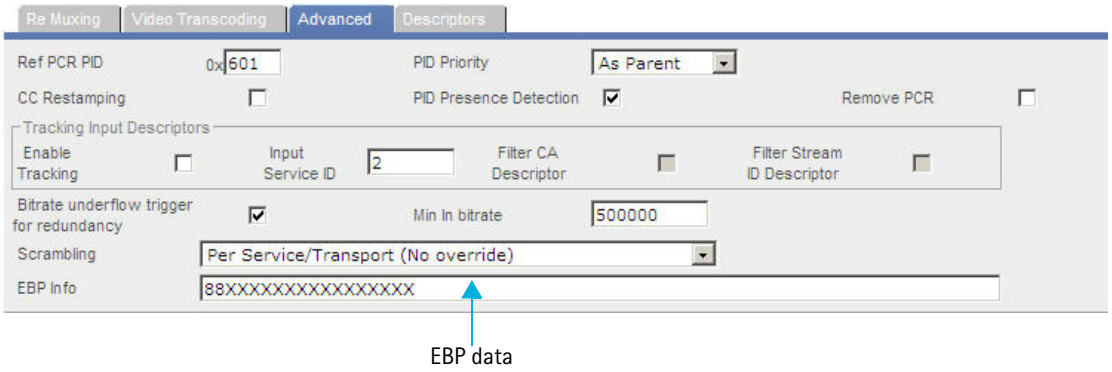
- EBP Tag - A9
- EBP Length - Number of bytes of the data portion.
- Data section - enter data according to the following rules:
  - Hex characters valid string, before and/or after the "Time info place holder".
  - Time info place holder - 16 Xs, to imply where to place NTP data.
  - Data section Default value is: 88xxxxxxxxxxxxxxx

For example, A909C8xxxxxxxxxxxxxxx, where:

- A9 - EBP Tag
- 09 - Actual Length, in bytes, after this field
- C8 - Data section (one byte size)
- xxxxxxxxxxxxxxx - Time place holder

To configure enhanced EBP signaling:

1. In the **Output** section, select the required transcoded video PID.
2. In **Video Transcoding** tab, open the **EBP Signaling** and select **Every GOP**.
3. Select the **Advanced** tab.

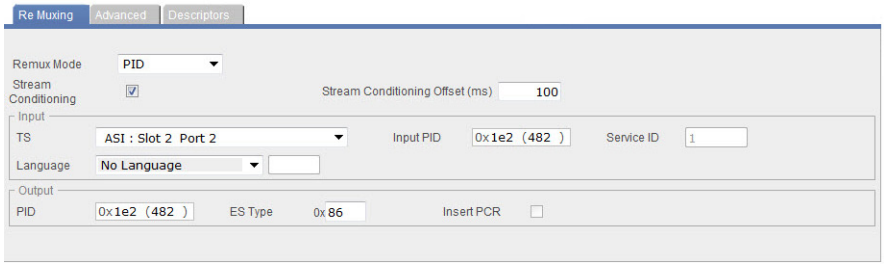


NOTE: Changing the configuration of EBP Info is not service affecting.

Stream Conditioning for DPI

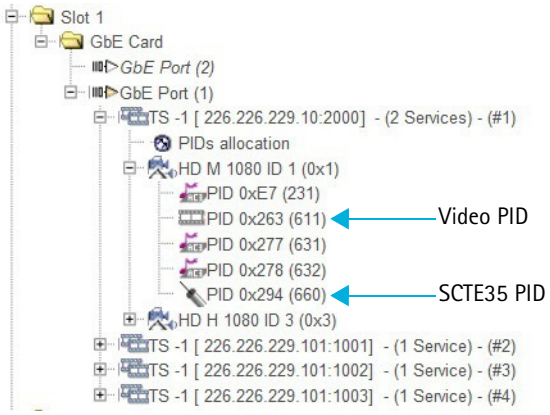
ProStream with ACE 5.2 and above supports stream conditioning to optimize the splice in/out points for downstream splicing. Stream conditioning, namely, GOP manipulation and VBV management on a video stream, is based on SCTE35 triggers.

ProStream also enables you to add a positive or negative offset in milliseconds to the stream conditioning location. This feature allows you to align preroll messages at the precise point of splicing. The offset value is applied to the PTS value which is taken from the SCTE35 message.



To configure stream conditioning:

1. In the **Output** section, drill down to the service with the transcoded video stream.



2. Select the SCTE35 PID and in the **Re Muxing** tab, select **Stream Conditioning**.

   The offset value range is -3000 to +5000.

   The default offset value is 0.
3. In the **Stream Conditioning Offset (ms)** field, type the required offset value.

Configuring CBR at Service Level

ProStream with ACE 5.2 controls the output bitrate at Service level. The transcoded video bitrate is controlled to maintain overall constant bitrate for the whole service while maintaining video quality. When audio or data PIDs are not transferred, the bitrate is utilized for the video stream. The video bitrate is maximized to the overall bitrate of the service.

NOTE: To allow CBR with service bitrate control, the video stream should be transcoded.

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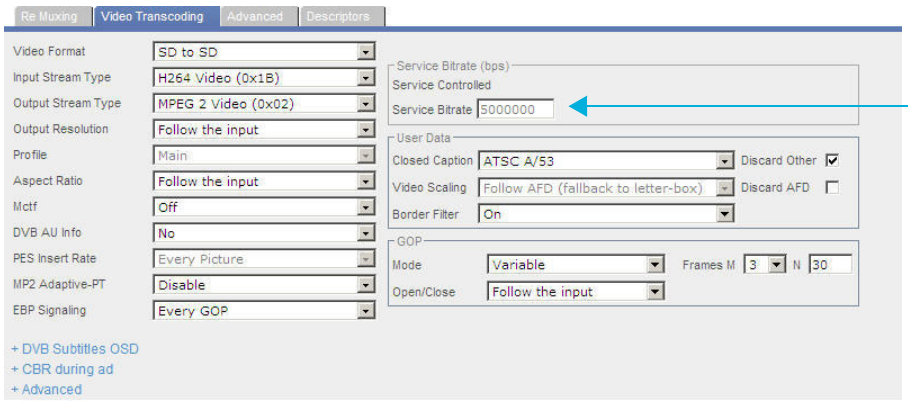
To configure a transcoded stream at the service level:

1. In the Output section, select the required service.
2. In the **Main** tab, focus on the **Bitrate** section.
3. To enable the feature, select **Service CBR**. The **Bitrate** box is enabled.
4. In **Bitrate**, enter the required service bitrate.

   This bitrate is maintained as the overall constant bitrate for the whole service while ensuring video quality. This bitrate appears as read only in the **Video Transcoding** tab:



Alarm Related to Bitrate Control at Service Level

- If the bitrate allocated for the video stream is too low, the alarm *Service CBR Bitrate Too Low* is raised by the service.
- If the overall bitrate of non-video streams exceeds the configured service bitrate, the alarm *Service CBR Overflow* is raised by the service.

Audio Transcoding

This version of ProStream 1000 also enables you to transcode audio PIDs. The density varies according to the input/output stream type and input/output codecs.

See *Audio Transcoding Options and Density*.

Table 6–11: Audio Transcoding Glossary

Term	Explanation
AC3	Dolby
E-AC3	Enhanced Dolby
AAC	Advanced Audio Coding
ALA	Audio Level Adjustment
HE-AAC	High-Efficiency Advanced Audio Coding
HE-AAC v1	High-Efficiency Advanced Audio Coding version 1
HE-AAC v2	High-Efficiency Advanced Audio Coding version 2
MC	Multichannel (5.0/5.1)

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Table 6–11: Audio Transcoding Glossary

Term	Explanation
MP1L2	MPEG1 Layer II
ST	Stereo (2/0), Joint Stereo, Mono (left or right channel), Dual Mono
LFE	Low Frequency Effects channel

Audio Transcoding Specifications

MPEG1 Layer 2

Table 6–12: MPEG1L2 Specifications

Parameter	Specification
Error Protection	Supports error protection

AAC

Table 6–13: AAC Specifications

Parameter	Specification
AAC Coding Extensions	Supports the following: ■ MPEG-4 AAC (LC) ■ MPEG-4 HE AAC ■ MPEG-4 HE AAC v2 ■ MPEG-2 AAC (LC) ■ MPEG-2 HE AAC ■ MPEG-2 HE AAC v2
Transport Format	■ ADTS ■ LATM
TNS	Supports Temporal Noise Shaping
PNS	Supports Perceptual Noise Substitution

Dolby®

ProStream 1000 supports Dolby specifications for AC-3 and E-AC-3. For Dolby supported parameters, see *Table 6–18*.

Audio Transcoding Options and Density

The device transcodes audio PIDs as listed in table *Table 6–14*.

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Table 6–14: Audio Transcoding Options

Output / Input			MP-1l2	AAC					Dolby			
				AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
			ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2		ST	V	V	V	V	V	V	V	V	V	V
AAC	AAC LC	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	HE-AAC V1	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	HE-AAC V2	ST	V	V	V	V	V	V	V	V	V	V
Dolby	AC3	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V
	E-AC3	ST	V	V	V	V	V	V	V	V	V	V
		MC	V	V	V	V	V	V	V	V	V	V

The following table lists the possible combinations of audio transcoding per transcoding card.

In *Table 6–15*, the numbers do not include ALA processing.

In *Table 6–16*, the numbers include ALA processing.

To define audio transcoding combinations, see table *Table 6–17*.

Table 6–15: Audio Transcoding Density without ALA

Output / Input		MP1L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	60	48	23	33	14	38	18	12	12	6
AAC (all flavors)	ST	46	38	20	28	13	31	16	11	12	6
	MC	27	24	16	20	11	21	13	10	10	5
Dolby ACE	ST/MC	33	29	18	23	12	25	14	10	10	5
Dolby E-AC3	ST/MC	22	20	14	17	10	18	12	9	9	5

Table 6–16: Audio Transcoding Density with ALA

Output / Input		MP1-L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	30	27	14	21	10	23	14	9	10	5
AAC (all flavors)	ST	26	23	13	19	9	20	13	8	10	5
	MC	18	17	11	15	8	16	11	7	8	4
Dolby AC3	ST/MC	21	19	12	16	9	17	11	8	9	5
Dolby E-AC3	ST/MC	16	15	10	13	8	14	10	7	8	4

The following table lists the required processing units per input/output transcoding option. Use this table for defining maximum capacity, per card, of any stream combination.

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NOTE: A single card has total of 3750 processing units.

ALA requires more processing units:

- ALA ST (2.0) requires 61 additional processing units.
- ALA MC (5.0/5.1) requires 104 additional processing units.

For example:

MP1L2 to MP1L2 (Stereo) without ALA: requires 63 processing units.

MP1L2 to MP1L2 (Stereo) with ALA: 63+61 = 123 processing units.

Table 6–17: Audio Transcoding Required Processing Units

Output / Input		MP1-L2	AAC					Dolby			
			AAC LC		HE-AAC V1		HE-AAC V2	AC3		E-AC3	
		ST	ST	MC	ST	MC	ST	ST	MC	ST	MC
MP1L2	ST	63	79	164	114	268	99	209	313	313	625
AAC (all flavors)	ST	82	99	188	134	289	121	235	341	313	625
	MC	139	157	235	188	341	179	289	375	375	750
Dolby AC3	ST/MC	114	129	208	163	306	150	255	348	342	627
Dolby E-AC3	ST/MC	168	184	263	218	360	205	310	403	397	681

Audio Transcoding Bitrate

The following table lists the audio ES bitrate in kbps. The allowed bitrate values are according to input/output stream type - MP1L2/AAC/AC3 and Coding Mode - single/stereo/multi channel.

Bitrate default values:

- 192kbps - For Single/Stereo channel
- 384kbps - For Multi channel

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Dolby® Supported Parameters

Table 6–18: Dolby Supported Parameters

Topic	Parameter
Bitstream Information (BSI)	Bit Stream Mode
	Dialog Normalization
	Production Information (mix level and room type)
BSI Extension	Stereo Downmix Preference
	Mix Levels
	Surround EX Mode
	Head Phone Mode
	A/D Converter Type
	Alternate BSI Syntax
E-AC3 additional configuration	Source Sample Rate
	Stream Type
	Sub Stream ID
Processing	DC High Pass Filter
	Bandwidth Low Pass Filter
	Digital De-emphasize
	Dynamic Range Compression
Multichannel Processing	LFE Low Pass Filter
	90 Degree Phase Shift
	3 dB Attenuation

Audio Transcoding Procedure

The following tables describe input and output coding options according to input/output streams.

Coding mode options depend on the selected input stream type as the following table shows.

Table 6–19: Input Coding Options according to Input Stream Type

Input Stream Type	Input Coding Options
MPEG1 Layer II	Any input coding. Not configurable
AC-3/E-AC-3 all flavors ACC	Any
	Stereo/Mono
	Multichannel

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Decoding Format enables you to allocate trandcoding resources. If the decoding format of the input stream is unknown, select **Any**. If a low MHz decoder (AAC LC / AC3) is selected and the actual decoding format is a high MHz decoder (AAC HE / E-AC3), an alarm is raised.

Table 6-20: Input Decoding Format Options according to Input Stream

Input Stream Type	Decoding Format Options
MPEG1 Layer II	Any decoding format. Not configurable
AC-3 ATSC	
E-AC-3 ATSC	
AC-3/E-AC-3 DVB	Any
	AC-3 (default)
	E-AC-3
AAC	Any input decoding format
	AAC LC
	ACC HE

Coding mode options depend on the selected output stream type, as described in the following table.

Table 6-21: Output Coding Options according to Output Stream Type

Output Coding Options	MPEG1L2	AAC	HE AAC V1	HE AAC V2	AC3/E-AC3
Follow the input	V	V	V		V
Stereo (2/))	V	V	V	V	V
Single channel left (1/0)	V	V	V		V
Single channel right (1/0)	V	V	V		V
Dual Mono (1+)	V	V	V		V
Joint Stereo (2/0)	V		V		
Multi Channel (3/2)		V	V		V
Multi Channel (3/2 LFE)		V	V		V

To transcode an audio PID:

1. In the **Output** section, select the required service.
2. Double click the service node to view its PIDs.
3. Select the required audio PID.
4. In the **Re Muxing** tab, select **Transcode**.
5. Select the **Audio Transcoding** tab.
6. To select the input stream type, open the **Input Stream Type** list and select one of the following:

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- MPEG1 Layer II (0x3)
- MPEG1 Layer II (0x4)
- AC-3/e_AC-3 DVB 90x6)
- ACC in ADTS (0xF)
- ACC in LATM (0x11)
- AC-3 ATSC (0x81)
- E-AC-3 ATSC (0x87)

7. To select the Output stream type, open the **Output Stream Type** list and select the required type:
   - MPEG1 Layer II (0x3)
   - MPEG1 Layer II (0x4)
   - AC-3/E-AC-3 DVB (0x6)
   - ACC in ADTS (0xF)
   - ACC in LATM (0x11)
   - AC-3 ATSC (0x81)
   - E-AC-3 ATSC (0x87)

   Input Coding Mode enables you to allocate transcoding resources. If the coding of the input stream is unknown, whether ST (fewer resources) or MC (more resources), select **Any**. If ST is selected and the input coding is MC, an alarm is raised.
8. Click the **Input Coding Mode** list and select the required coding mode.

   See *Table 6–19*.
9. Click the **Decoding Format** drop-down list and select the required decoding format.

   See *Table 6-20*.
10. Click the **Output Coding Mode** list and select the required coding mode.

    Coding mode options depend on the selected output stream type as the following table lists. **See table 6-21, Coding Options according to Output Stream Type**. See *Table 6-21*.

NOTE: .Any change to input/output Codec, input/output Coding Mode, and output AAC is service affecting.

11. Click the **ES Bitrate** list and select the required output ES bitrate.

    The bitrate list is updated according to the output stream type and the selected output codec.

    TS Bitrate is updated to display the total TS bitrate. View TS bitrate in **TS Bitrate** box.
12. Transcoded audio streams may carry PCR. To carry a PCR select the **Insert PCR** box.

NOTE: S.ampling rate is always *Follow the input*. The sampling rate is 48 kHz and it is not converted.

To configure advanced audio transcoding options:

1. Click **Advanced**.
2. To select the required copyright mode, open the **Copyright Signaling** list and select one of the following
   - Copyright - Original: indicates that the audio stream is copyright protected by the original copyright bitstream
   - Copyright - Copy: indicates that the audio stream is copyright protected by a copy of the copyright bitstream

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- Not Copyright: Original - the original audio stream is not copyright protected.
- Not Copyright: Copy - the copy of the audio stream is not copyright protected.
- Follow the input

3. **PES per Frame** - To control the number of Audio frames that are packed in a single PES (Packetized Elementary Stream), open the **Frames per PES** list and select the required number between one to six. Six is the default.
4. **Fixed Gain (dB)** - If ALA is not used, you can configure a fixed gain adjustment for the output audio stream. It increases/decreases the audio volume by a fixed dB value. The valid range is (-20) to 0 dB and the default value is 0. See *Configuring Audio Level Adjustment*.
5. **Audio Sync Compensation (msec)** - To adjust audio delay (PTS) to compensate for input with A/V synchronization problems, enter the required value, between (-500) to 500ms. The default value is 0.

Configuration Following the Output Stream Type

Output stream type, allows configuration specific to this stream type. The **Audio Transcoding** tab changes to allow this specific configuration as the following sections indicate.

Specific MPEG1L2 Configuration

The following instructions assume that the output stream type is **MPEG1 Layer II**.

To specify an MPEG 1 L2 Configuration:

1. Assuming that in **Audio Transcoding** tab, in **Output Stream Type** you have selected **MPEG1 Layer II**.
2. To configure, click **MP1L2** menu.
3. To enable error protection, select the **Error Protection** check box.

Specific AAC Configuration

AAC and HE AAC can be encapsulated in the output transport stream in either of the following methods:

- ADTS (Audio Data Transport Stream) is the encapsulation method used if you select MPEG-2 HE AAC as the coding mode extension. ADTS is assigned a stream type value of 0x0F.
- LATM (Low-overhead Audio Transport Multiplex) is the default encapsulation method used if you select MPEG-4 HE AAC as the coding mode extension. LATM is assigned a stream type value of 0x11.

To define a specific AAC configuration:

The instructions below assume that the output stream type is **AAC** or **HE AAC**.

1. Assuming that in **Audio Transcoding** tab, in **Output Stream Type** you have selected **ACC or HE ACC**.

   The **ACC** menu appears.
2. To select a coding extension, open the **Coding Mode** list and select one of the following:
   - MPEG-4 AAC (LC)
   - MPEG-4 HE AAC
   - MPEG-4 HE AAC v2
   - MPEG-2 AAC (LC)
   - MPEG-2 HE AAC

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- MPEG-2 HE AAC v2

3. To enable Temporal Noise Shaping (TNS), select **TNS**.
4. To enable Perceptual Noise Substitution (PNS), select **PNS**.

   When **Coding Mode** is **MPEG-2**, PNS is selected not configurable. When **Coding Mode** is **MPEG-4**, PNS is selected and is configurable.
5. Select **Error Protection**.

Specific Dolby ® AC-3™/E-AC-3™ Configuration

The following instructions assume that the output stream type is AC-3 all flavors.

To specify a Dolby ® AC-3™/E-AC-3™ Configuration:

1. Assuming that in **Audio Transcoding** tab, in **Output Stream Type**, you have selected an AC-3 stream or any of its flavors.

   The **AC-3/E-AC-3** menu appears (below the **Advanced** menu)
2. Click the **AC-3/E-AC-3** menu.
3. To configure, open the required menu and define parameters as explained in the following sections:
   - General menu, see *AC-3 All Flavors General Menu*
   - Audio Service Configuration, see *AC-3 All Flavors Service Configuration Menu*
   - Bitstream, see *AC-3All Flavors Bitstream Menu*
   - Preprocessing, see *AC-3 All Flavors Preprocessing Menu*
   - Multichannel, see *AC-3 All Flavors Multichannel Menu*
   - BSI Extension, see*AC-3 All Flavors BSI Extension Menu*

AC-3 All Flavors General Menu

To use the All Flavors General menu:

1. Click the **General** menu.
2. The **Encoding Format** list is enabled for output stream type AC-3/E-AC-3 only. In this case, select either AC-3, Dolby, or E-AC-3, Dolby plus.

AC-3 All Flavors Service Configuration Menu

To use the All Flavors Service Configuration menu:

1. Click the **Audio Service Configuration** menu.

   The bitstream mode describes the audio service contained within the Dolby Digital bitstream. The stream can carry a main audio service or an associated service. The default bit stream mode is Complete Main.
2. Open the **Bit Stream Mode** list and select one of the following modes:
   - Follow the input
   - Main audio: Complete Main - A complete audio service that includes dialog, music, and effects. You can supplement a complete audio service with visually impaired, hearing impaired, commentary, emergency, and karaoke/voice-over associated services.
   - Main Audio: Music and Effects - An associated service with music and effects but no dialog for the program. You can add the dialog by providing a dialog-associated service.
   - Associated: Visually Impaired - An associated service with a narrative description of the program's visual content. Audio service for the visually impaired allows the viewer to enjoy the audio aspects with a commentary of the visual aspects of the program.

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- Associated: Hearing Impaired - An associated service with a single channel of dialog but no music or effects. For the hearing-impaired viewer, the dialog is easier to understand without the combination of music and sound effects in the audio stream.
- Associated: Dialogue - An associated service with multiple channels for several different languages.
- Associated: Commentary - An associated service similar to the dialog-associated service that provides optional program commentary, not the primary dialog for the program. Used for added commentary during sporting events or educational programming.
- Associated: Emergency - An associated service with audio tones that accompany emergency announcements. The tones replace the main audio of a program.
- Main/Associated: Karaoke/Voice-Over - An associated service similar to the emergency-associated service, but karaoke audio tones do not replace the main audio of a program.

Dialog Normalization (dBFS) – (Also known as dialnorm)

This is the most important Dolby Digital metadata parameter. Its setting represents the average loudness of dialog in a presentation, and is defined in terms of decibels below 0 dBFS.

When received at the consumer's Dolby Digital decoder, this parameter setting determines the level shift in the decoder that sets, or normalizes, the average audio output of the decoder to a preset level. This aids in matching audio volume between program sources. A dialnorm value of –31 results in no level shift, a value of –1 results in maximum level shift.

The proper setting of the dialog level parameter enables the Dynamic Range Control profiles chosen by the content producer to work as intended in less-than-optimal listening environments.

To use the Dialog Normalization menu:

- Open **Dialog Normalization (dBFS)** and select one of the following:
  - Follow the Input,
  - A value between -1 to -31(dBFS).

AC-3All Flavors Bitstream Menu

The parameters in the **Bitstream** menu relate directly to the Dolby Digital Plus bitstream information fields.

To use the All Flavors Bitstream menu:

1. Click the **Bitstream** menu.
2. Surround Mode - indicates whether the two-channel Dolby Digital (AC-3) stream contains a Dolby Surround (Lt/Rt) program that requires Dolby Pro Logic^{R} decoding. Open the **Surround Mode** list and select one of the following modes:
   - Follow the input
   - No indication
   - Not Encoded in Dolby Surround - The bitstream contains information not encoded in Dolby Surround.
   - Encoded in Dolby Surround - The bitstream contains information encoded in Dolby Surround. After
3. Mix Level (dBSPL) - describes the peak sound pressure level (SPL) used during the final mixing session at the studio or on the dubbing stage. Open the **Mix Level (dBSPL)** list and select one of the following:

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- Follow the input
- A value between 80 to 111dB, in 1 dB increments

4. Room Type - Describes the equalization used during the final mixing session at the studio or on the dubbing stage.

   A large room is a dubbing stage with the industry standard X-curve equalization; a small room has flat equalization. This parameter allows an amplifier to be set to the same equalization as heard in the final mixing environment.

5. Open the **Room Type** list and select one of the following:
   - Follow the input
   - Not indicated - The room type is not identified in the stream
   - Large room, X curve monitor - Film-style dubbing stage, x-curve monitoring
   - Small room, flat monitor - Typical recording studio, flat monitoring
6. AC-3 Center Mix Level (dB) - Applies to Encoding Format AC-3 only.

   It indicates the level shift applied to the C channel when adding to the L and R outputs as a result of downmixing to an Lt/Rt output. Open the **AC-3 Center Mix Level (dB)** list and select one of the following:
   - Follow the Input
   - -3
   - -4.5
   - -6
7. AC-3 Surround Mix Level (dB) - Applies to applies to Encoding Format AC-3 only.

   Indicates the level shift applied to the surround channels when downmixing to an Lt/Rt output. Open the **AC-3 Surround Mix Level (dB)** list and select one of the following:
   - Follow the Input
   - -3
   - -6
   - ∞

AC-3 All Flavors Preprocessing Menu

The parameters listed in the **Preprocessing** menu are associated with the preconditioning of audio input signals before they are transcoded.

To define audio input signal parameters:

1. Click the **Preprocessing** menu.
2. DC HighPass Filter - By default this filter is enabled.

   Activates a 3-Hz direct current (DC) filter for all input channels. The DC filter removes any inaudible low frequency signals and also any DC bias in the input signal.

3. Bandwidth LowPass Filter - Select to enable this filter.

   Activates a bandwidth low pass filter with a cut-off close to the audio bitrate you specified.

4. Digital De-emphasize - Specifies whether de-emphasis is on or off.

   In some cases, an audio signal may be scaled with a 50/15 microsecond pre-emphasis prior to its transmission.

5. Dynamic Range Compression (DRC) - Different home listening environments present a wide range of requirements regarding dynamic range.

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Rather than simply compressing the audio program to work well in the poorest listening environments, Dolby Digital encoders can calculate Dynamic Range Control (DRC) information and send it via the Line Mode and RF Mode metadata parameters to the consumer decoder. This metadata can then be applied to the audio signal by the decoder to reduce its dynamic range.

Through the proper setting of DRC profiles during content creation, the producer can provide the best possible presentation of program content in virtually any listening environment, regardless of the quality of the equipment, number of channels, or ambient noise level in the consumer's home.

Six preset DRC profiles are available to content producers: Film Light, Film Standard, Music Light, Music Standard, Speech, and None. Each is applied with the following values.

To set the required **Dynamic Range Compression**, open the DRC list and select the profile that represents the acceptable range for the program type as explained below. You can select:

- None
- Film Standard and Film Light - In most movies, the dialog is the softest audible part of the sound track. Anything softer in volume than the dialog may not be heard in a typical movie theatre. Therefore, movie sound tracks require only a small amount of volume boost for low levels. Too much boost of low-level audio may reveal unintended sounds in the audio sound track, such as camera reels and background traffic noise that were recorded during production. Dolby recommends setting Film Standard for most program material.
- Music Standard and Music Light - The acceptable volume range is determined by the music type. Most music has a limited variation in volume range, but you must set an acceptable level so the sound is not too far above other programming.
- Speech - Most speech sources have limited dynamic range of audio fluctuation. However, some speech sources can have moments that are abnormally loud or soft. The Speech profile uses a 10 dB acceptable range for average speech. If the speech source contains a heavy amount of background noise, use Film Standard or Film Light so the background noise is not audible during gaps in the speech content.

AC-3 All Flavors Multichannel Menu

This menu is available for Dolby AC-3 audio streams when Multichannel coding mode is selected.

To define Dolby AC-3 audio stream parameters:

1. Click the **Multichannel** menu.

NOTE: Output Coding Mode should be **Follow the input** or **Multichannel.3/2** and **3/2+LFE**.

2. LFE LowPass Filter - must be provided only if the LFE channel is enabled. Select the **LFE LowPass Filter** box to turn on low-pass filter for low-frequency effects.
3. The following fields allow you to enable processing options for the surround audio channel:
   - **90 Degree Phase Shift** - Select to modulate the phase of the reference signal by 90 degrees.
   - **dB attenuation** - Select to enable 3 dB attenuation of the surround audio.

AC-3 All Flavors BSI Extension Menu

Bitstream extended information is additional information to be carried about the audio program and also more choices for stereo downmixing. When the metadata parameters carried in Dolby Digital were first described, they were generically called bitstream information, or BSI. The additional parameter definitions are called extended BSI.

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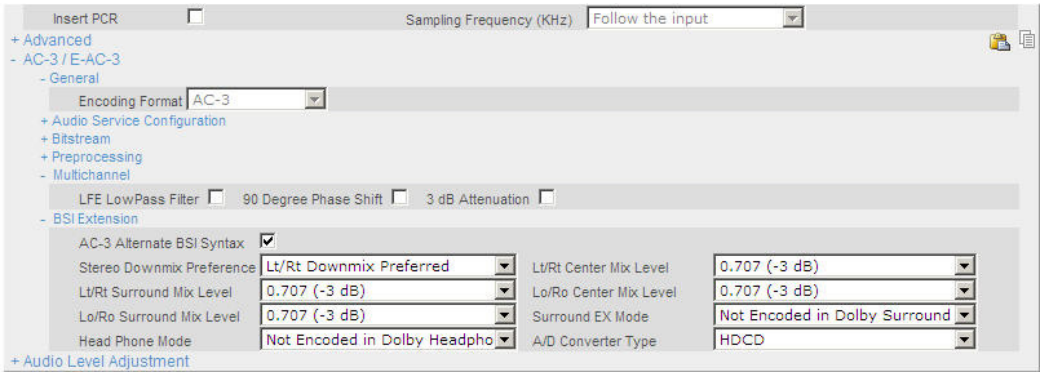
Defining extended BSI parameters:

To define extended BSI parameters:

1. Click the **BSI Extension** menu.

NOTE: Output Coding Mode should be Follow the input or Multichannel.3/2 and 3/2+LFE



2. **AC-3 Alternate BSI Syntax** - Select to enable the following BSI extension parameters.
3. **Stereo Downmix Preference** - Indicates whether the preferred stereo downmix is one of the following:
   - Not Indicated
   - Lt/Rt Downmix Preferred - Left total/right total
   - Lo/Ro Downmix Preferred - Stereo left only/stereo right only
4. **Lt/Rt Surround Mix Level** - Select the surround mix level for left total/right total downmixing.
5. **Lo/Ro Surround Mix Level** - Select the surround mix level for left only/stereo right only downmixing
6. **Head Phone Mode** - Select one of the following:
   - Not Indicated
   - Not Encoded in Dolby Headphone
   - Encoded in Dolby Headphone
7. **Lt/Rt Center Mix Level** - Select the center mix level for left total/right total downmixing.
8. **Lo/Ro Center Mix Level** - Select the center mix level for left only/stereo right only downmixing
9. **Surround EX Mode** - Indicates whether the audio is encoded for Dolby ® Digital Surround EX™. Select one of the following:
   - Not Indicated
   - Not Encoded in Dolby Surround EX
   - Encoded in Dolby Surround EX
10. **A/D Converter Type** - Select the type of analog-to-digital converter: Standard or HDCD Encoded.

Configuring Audio Level Adjustment

There are two modes of audio levels:

- ITU: The International Telecommunication Union that regulates international use of the telecommunication infrastructure.

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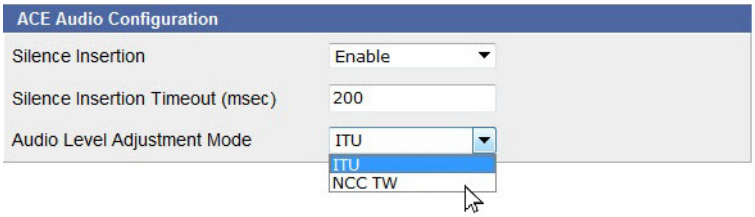
- NCC: National Communications Commission that regulates the development of telecommunications in Taiwan

To select the audio level mode:

1. Click the **Tools** tab and then click **A/V Processing**.
2. In the ACE Audio Configuration dialog box, select the audio level mode from the A**udio Level Adjustment Mode** dropdown list.



See *Adjusting ITU Audio Levels* and *Adjusting NCC Audio Levels*.

Adjusting ITU Audio Levels

To adjust ITU levels:

1. In the **Audio Transcoding** tab, click **Audio Level Adjustment**.

   Audio Level Adjustment expands to display additional parameters.
2. Click **General** and configure the following parameters:
   - **ALA Enable** - Enables the ALA according to Level Magic LM™, an adaptive level control that adjusts audio levels from any source at any time to a given reference level.

     Enable this option when incoming source levels vary widely between channels (for example, if Service A seems much louder than Service B, or when transient audio level changes within the same channel during commercial breaks, explosions or loud music vs. dialog).

     Once you select this option, **Link Mode** and **Input Gain** become available and additional menus appear:
     - Automatic Gain Control - See *ITU Automatic Gain Control (AGC)*.
     - Transient Processor - see *Transient Processor*.
     - Limiter - see *Limiter*.
   - **Link Mode** - Use for multichannel (5.1) streams. There are two options for LFE control:
     - **Unlinked Derived** - Default. LFE follows the Input Gain (dB) configuration of 3/2.

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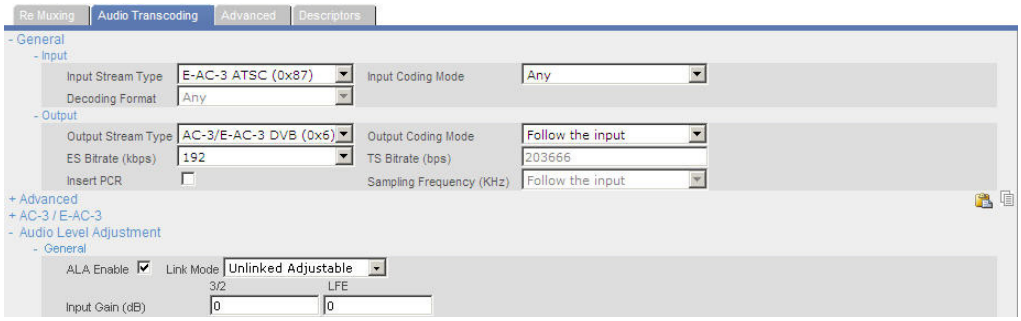
- **Unlinked Adjustable** - LFE might have a different Input Gain (dB) configuration than 3/2. Selecting this option also displays the Input Gain (dB) box for LFE.



- **Input Gain (dB)** - Allows you to configure the input signal level towards the target loudness level that streams into the ALA module. You can configure this parameter and prevent distortion of the input loudness level before the audio is processed in the ALA module. Enter the required value between -20 to +20dB in steps of 0.1dB.

ITU Automatic Gain Control (AGC)

Use the AGC to adjust the output level by performing slow gain changes.

To define gain control parameters:

1. Click the **Automatic Gain Control** menu.
2. Configure the parameters as explained for 3/2 and LFE:

TIP: Loudness Target (LKFS) is the main parameter when configuring the ALA processing module.

- Loudness Target - Allows you to configure the desired output loudness level in LKFS (Loudness, K-weighted, relative to Full Scale). A unit of LKFS is equivalent to a decibel. The range is from -40 to 0. The default level is -24.
- Time - The amount of time the ALA module takes to scale incoming audio with loudness levels not at target. The time range is from 1 second to 9000 seconds.
- Max. Gain - Limits the maximum amplification allowed by the AGC module.The range available is 0 to 20dB in steps of 0.1 dB.
- Freeze Level - Allows you to avoid the undesired gain increase during signal breaks and overshoots by following signal attack. If the input signal level decreases and reaches the freeze level, all the states of AGC (leveler) and transient processor are frozen and kept unchanged until the input signal level rises again. The range available is 0 to-70 in steps of 0.1dB.

Transient Processor

Use the Transient processor to adjust the output level by performing fast gain changes.

To define Transient parameters:

1. Click the **Transient Processor** menu.
2. Configure the parameters as explained for 3/2 and LFE:
   - Response - Indicates the characteristic of gain change by the transient processor. The response value depends on your program genre. Three values are available:
     - Soft - Select, in case there are just a few level changes or if you want to keep the original dynamic range best (e.g. classical music)
     - Mid - Select for mixed program

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- Hard - Select for live venues (sport etc.) with frequent unexpected level changes

3. Max. Gain - Limits the maximum amplification allowed by the Transient processor module. The range available is 0 to 20 dB in steps of 0.1 dB.

Limiter

The Audio brick wall limiter guarantees precise peak limiting without any distortion.

To define audio limiter parameters:

1. Click the **Limiter** menu.
2. Configure the parameters as explained below for 3/2 and LFE:
   - Max. Peak Level (dBFS) - The maximum loudness level. Dynamic audio level adjustment processing will ensure that audio loudness is below Max Peak Level. The default is –6.
   - Processing - Allows to define the behavior of the limiter, mostly affecting the release of the limiter audio level reduction. Several processing modes are available: Live, Speech, Universal (default) and Classic.

Adjusting NCC Audio Levels

To adjust NCC levels:

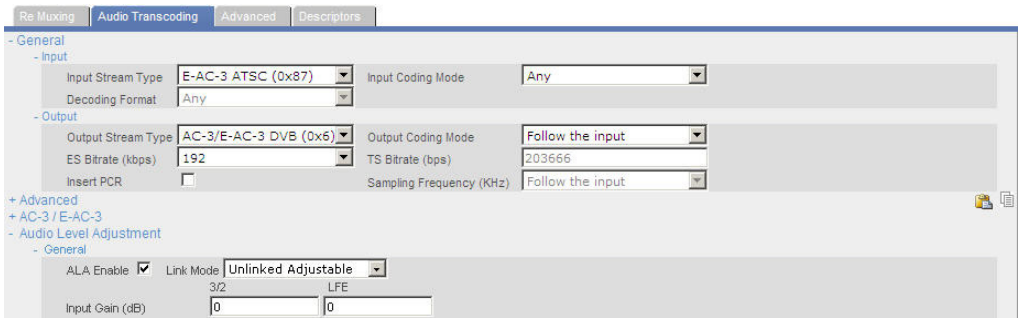
1. In the **Audio Transcoding** tab, click **Audio Level Adjustment**.

   Audio Level Adjustment expands to display additional parameters.

2. Click **General** and configure the following parameters:
   - **ALA Enable** - Enables the ALA according to Level Magic LM™, an adaptive level control that adjusts audio levels from any source at any time to a given reference level.

     Enable this option when incoming source levels vary widely among channels, for example, if Service A seems twice as loud as Service B, transient audio level changes within the same channel during commercial breaks, explosions or loud music vs. dialog.

     Once you select this option, **Link Mode** and **Input Gain** become available and the Automatic Gain Control menu appears. See *NCC Automatic Gain Control (AGC)*.
   - **Link Mode** - Use for multichannel (5.1) streams. There are two options for LFE control:
     - **Unlinked Derived** - Default. LFE follows the Input Gain (dB) configuration of 3/2.
     - **Unlinked Adjustable** - LFE might have a different Input Gain (dB) configuration than 3/2. Selecting this option also displays the Input Gain (dB) box appears for LFE.



   - **Input Gain (dB)** - Allows you to configure the input signal level towards the target loudness level that streams into the ALA module. You can configure this parameter and prevent distortion of the input loudness level before the audio is processed in the ALA processing module. Enter the required value between -20 to +20dB in steps of 0.1dB.

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NCC Automatic Gain Control (AGC)

Use the AGC to adjust the output level by performing slow gain changes.

To define gain control parameters:

1. Click the **Automatic Gain Control** menu.
2. Configure **Loudness Target** as explained for 3/2 and LFE.

   You can configure the desired output loudness level in dBFS. The range is from -36 to -16. The default level is -24.

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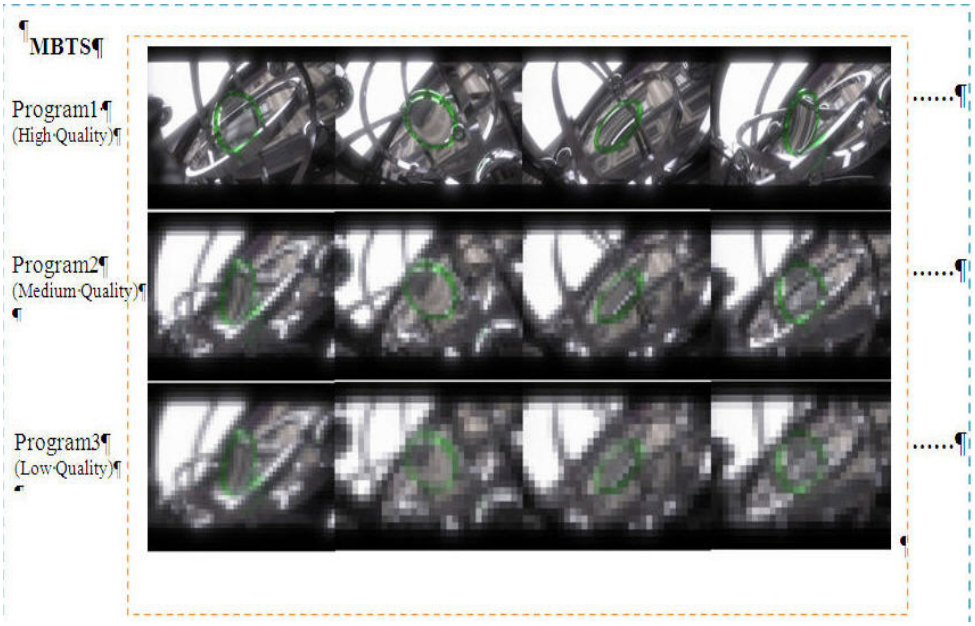
Chapter 7
Multiscreen Transcoding

Overview

This version of ProStream 1000 transcodes services and may output them also as multiscreen compliant services. ProStream 1000 produces a valid output for mobile Web devices that support multi-bitrate switching such as Apple iPhone, Microsoft Silverlight Smoothing Streaming Player, Adobe Flash Player.

NOTE: ProStream 1000 may simultaneously transcode broadcast streams and multiscreen compliant streams.

To comply with multiscreen specifications, ProStream 1000 outputs an MBTS (Multi Bitrate Transport Stream). MBTS is composed of SPTSs (Single Program Transport Streams), or several profiles that output the same service data in different quality levels. The following illustration shows a typical MBTS with three profiles:



Glossary

The following table lists transcoding multiscreen common terminology:

Table 7–1: Transcoding Multiscreen Terminology

Item	Explanation
ABR	Average Bitrate
CBR	Constant Bitrate
HD	High Definition video format

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Table 7–1: Transcoding Multiscreen Terminology

Item	Explanation
MBTS	Multi Bitrate Transport Stream
PTS	Presentation Time Stamp
SAR	Sample Aspect Ratio
SPTS	Single Program Transport Stream
SD	Standard Definition video format
Sub-SD	This video format includes all resolutions that are below the resolutions supported by SD.
VBR	Variable Bitrate

The following table shows the transcoding multiscreen specifications:

HD/SD/Sub-SD Specifications

ACE 5.1 and higher supports a wide range of resolutions to allow flexibility. The following tables shows the supported resolutions.

NOTE: HD output - any output resolution that is greater than 720W or 576H.

NOTE: For 1024x768 - If the input is 720p, force output to be equal to input Vertical resolution (1024x720) and *Input Vertical Resolution Mismatch* alarm is raised.
Up conversion (SD to HD) is not supported.

Processing Multiscreen Streams

Overview

The multiscreen streams outflow the device in MBTSs. Each MBTS includes up to 12 SPTSs, or profiles. The provisioning includes the following stages:

- Defining the required device frequency. See *Setting Device Frequency*
- Selecting the required input service and output port
  - Input service - the service flows into the device over a GbE port
  - Output Port - multiscreen services outflow over a GbE port. You need to define a multicast IP to outflow the MBTS.

  See *Transcoding Multiscreen Streams*.

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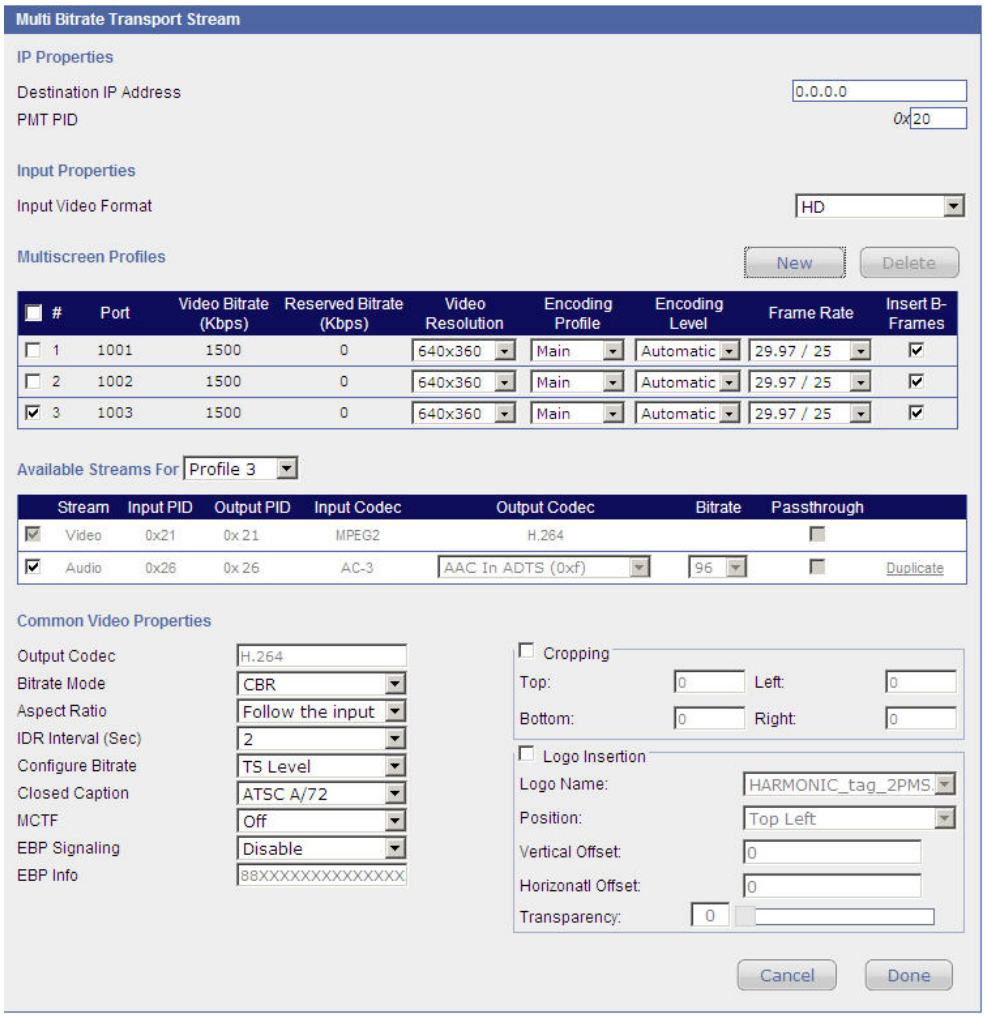
- Configuring the multiscreen parameters - Configuration is done using the **Multi Bitrate Transport Stream** page as explained in *Transcoding Multiscreen Streams*.



Configuration includes:

- Setting unique stream parameters as explained in the following instructions.
- Setting parameters common to all streams in an MBTS as explained in the following instructions.

NOTE: Once you configure a transcoded video stream as an multiscreen stream, you cannot configure the video stream via the **Video Transcoding** tab.
You can configure the transcoded audio stream via the **Audio Transcoding** tab and all changes apply to all audio streams in a profile.

Cropping

Cropping is performed on the input stream, before the stream is encoded to other output profiles. You can configure cropping parameter for top/bottom/left/right.

The cropping range is 0 to 100 pixels for SD or HD input streams. Only even numbers are supported. The default value is zero. You can change the cropping parameters on the fly.

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Cropping parameters are specified with respect to full resolution. If the input horizontal resolution is not full-resolution, the cropping parameter are scaled and rounded up to the next even number. For vertical resolution, it is always full resolution. Thus, no scaling of cropping is necessary for top and bottom.

Logo Insertion

The Logo Insertion feature places a small user-provided logo image over the input video. The image is static (non-animated) and it can have transparent and semi-transparent regions.

Setting Device Frequency

To set the device frequency:

1. Select **Tools** > **A/V Processing** tab.
2. Focus on the **ACE Video Configuration** section, **Video Frequency** option.
3. Open the **Video Frequency** list and select either 50 or 60 Hz.

Transcoding Multiscreen Streams

To transcode multiscreen streams:

1. In the Input section, select the required service. The service can inflow over a GbE port.
2. In the Output section, select the required GbE port. The multiscreen streams can outflow over a GbE port only.
3. Click **New MBTS**

NOTE: A click on **New MBTS/Edit MBTS** opens the **Multi Bitrate Transport Stream** page when the required input and output components are selected as explained in step 2 and 3.

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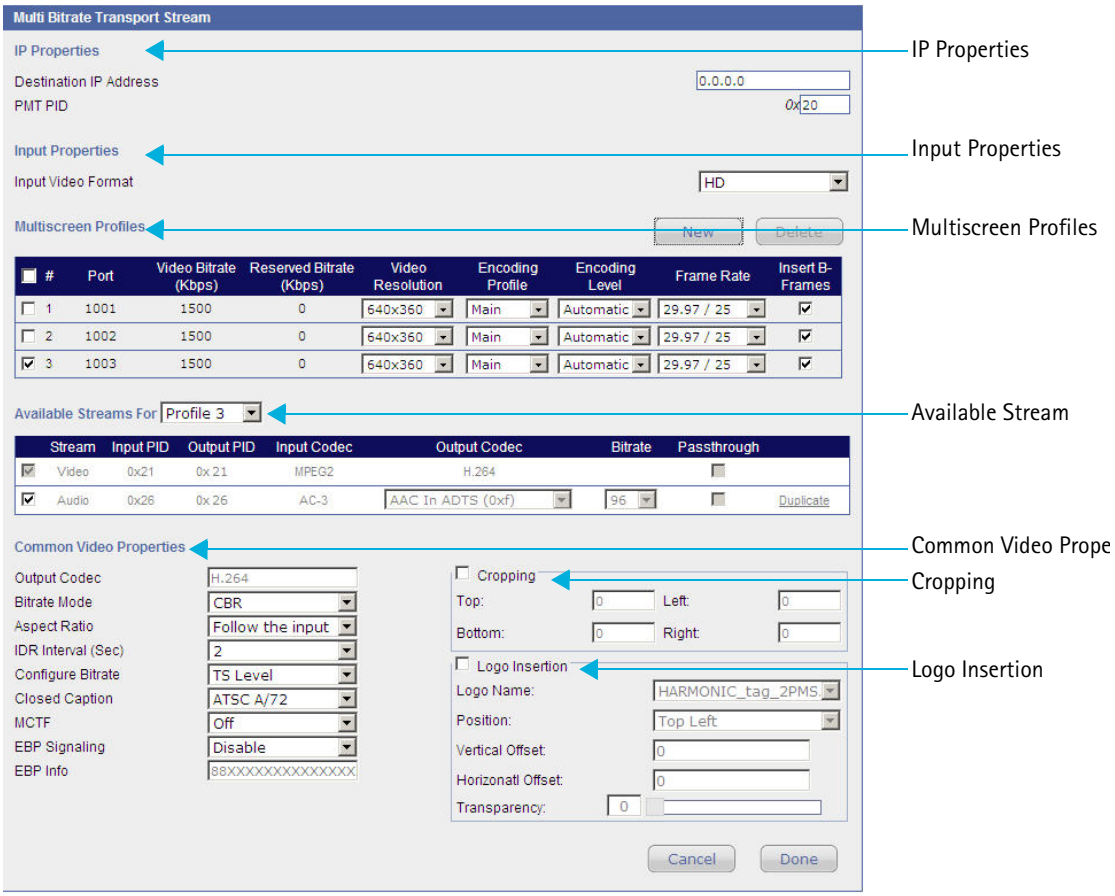
The **Multi Bitrate Transport Stream** page opens:



4. Focus on **IP Properties** section to define the output:
   - In **Destination IP Address**, enter a multicast IP address to outflow the MBTS.

     This multicast IP address with a UDP port is specific for each multiscreen profile, define the SPTS included in the MBTS. For UDP definition, see step 7.2.
   - In **PMT PID**, enter the PMT PID of all programs included in the profile.

Output bitrate ranges and resolution depend on the input video format. Prior to the profile configuration, you should define the input video format.

To define the input video format:

- In the **Input Properties** section, click the **Input Video Format** list and select either **HD** or **SD**.

  The **New** button is enabled and the **Multiscreen Profiles** section is updated according to the selected input video format. Once you select an input, the **Select Input** option is removed.

To define a profile:

1. In the **Multiscreen Profiles** section, click **New t**o create a multiscreen profile.
2. Under **Port**, define the output UDP port of the profile.
3. Under **Video Bitrate**, enter the required bitrate fro the available range.
   - **Reserved Bitrate** - The total bitrate required for all passthrough audio/data PIDs that are attributed to this MBTS profile. If you changed the passthrough PID configuration, enter under **Reserved Bitrate** the appropriate bitrate following your changes to passthrough data/audio PIDs. Reserved Bitrate is automatically calculated, but you can configure it in

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case passthrough the PID configuration is changed and it is required to re-set the total bitrate of the passthrough PIDs within the output TS. Automatic Calculation of Reserved bitrate is as follows:

- In CBR Mode - Video Bitrate + Transcoded Audios (TS) Bitrate + PSI + Reserved Bitrate (for all passthrough streams)
- In ABR Mode - (Video Bitrate)*4 + Transcoded Audios (TS) Bitrate + PSI + Reserved Bitrate (for all passthrough streams)

NOTE: If the automatic calculation adds a high overhead of Null packets to the output TS, you can adjust it by re-setting the Reserved Bitrate.

4. Under **Video Resolution**, select the required resolution.

   See *Table 7–1*

5. Under **Encoding Profiles**, select the required profile. The options are:
   - **Baseline**
   - **Main**
   - **High**.
6. Under **Encoding Level**, select either:
   - Automatic - encoding level is automatically defined according to the frame size, frame rate and max bitrate.
   - Available levels: 1.1, 1.2, 1.3, 2.0, 2.1, 2.2, 3.0, 3.1, 3.2, 4.0, 4.1. If a configurable level does not comply with the configured frame size, frame rate and bitrate, ACE accepts the configured level and raises the alarm *Encoding level violation*.
7. Under **Frame Rate**, select either of the following:
   - 29.97 / 25 - applies to Full frame rate, where:
     29.97 fps for 60Hz (default)
     25 fps for 50Hz (default)
   - 14.98 / 12.5 - applies to Half frame rate, where:
     14.985 fps for 60Hz (default)
     12.5 fps for 50 Hz
   - Under **Insert B-Frame**, select to insert B-Frames.

   Each profile can have up to 25 PIDs. Each profile has a transcoded video stream. It might have multiple transcoded audio streams and data streams.
8. To define/view the streams, in the **Available Streams** section, in the **Select** box:
   - Video PID - always selected and the box is grayed out.
   - Audio PID - select/de-select the required audio PID.
   - Data PID - select/de-select the required data PID. If selected, it is always passthrough.
9. Under **Stream**, view the stream type, whether video, audio or data.
10. Under **Input PID**, view the input PID.
11. Under **Output PID**, enter the required output PID.
12. Under **Input Codec**, view the codec of the input video/audio PID.
13. Under **Output Codec**, view the output codec of the video stream.

    The output codec video stream is H.264 only. The output audio codec is AAC unless you pass through the audio stream. In this case the output codec is as in the input.
14. Under **Bitrate**, open the bitrate list and select the required bitrate.

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15. To transmit the stream with no changes, select **Passthrough**.

    To duplicate the stream, see *Duplicating Audio/Data Streams*.

16. To define the parameters common to all multiscreen streams, in the **Common Properties** section, in **Output Codec**, view the output codec.

    The output codec is H.264.

17. Open the Bitrate Mode list and select either of the following:
    - CBR - Constant Bitrate
    - ABR - Average Bitrate

18. **Aspect Ratio** - Allows you to match picture to type of screen, standard or wide screen. To configure aspect ratio, open the **Aspect Ratio** list and select one of the following:
    - Follow the Input
    - 4:3
    - 16:9

NOTE: To form a 16:9 image when the input aspect ratio is 4:3, the input image is rescaled with black pixel columns added to the left and right sides of the rescaled image (i.e., pillar-boxing).

19. In **IDR Interval (sec)**, enter the required interval between the IDR frames.
20. Open the **Configure Bitrate** list and select either of the following:
    - TS Level - The baseline for calculating the output transport stream bitrate includes the ES bitrate and the TS header encapsulation overhead
    - ES Level - The baseline for calculating the output transport stream bitrate includes only the ES bitrate
21. Open the **Closed Caption** list and select either of the following:
    - ATSC A/72
    - Discard

NOTE: Closed caption/V-Chip information is passed through only for full frame rate profiles (29.97fps), due to standards restriction.

MCTF (Motion-Compensated Temporal Filtering) - by default it is off. Mctf affects the video quality and reduces noises. If the service bitrate is low it is recommended to use strong Mctf. However, strong MCTF affects the sharpness of the picture. To select the required Mctf, open the **Mctf** list and select the required level ranging from very weak to very strong.

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EBP (Encoder Boundary Point) - is disabled by default. EBP is a signaling mechanism for creating fragments or segments from audio or video streams. It also can provide a timing field to indicate encoding time that can be used for synchronization purposes. EBP applies to both Broadcast and Multiscreen modes as the following table shows:

Table 7–2: EBP Modes

EBP Mode	Broadcast	Multiscreen
Disabled	V	V
Every GOP	V	
Every Segment		V

To select the required EBP:

1. Open the EBP list and select the following:
   - In Multiscreen mode - Select either **Disable** or **Every Segment**.
   - In Broadcast mode - Select either **Disable** or **Every GOP**.
2. **EBP Info** - applies to advanced users only. By default this field is enabled only when **Every Segment** is selected in **EBP**. When enabled, enter the required info according to the explanation in *EBP Advanced Configuration*.

NOTE: Changing the configuration of EBP Info is not service affecting.

3. To configure cropping parameters, focus on the **Cropping** section.
   - To enable the **Cropping** section, select **Cropping**.
   - Enter the desired cropping values in the **Top**, **Left**, **Bottom** and **Right** boxes. You need to enter a value between 0 to 100 and it should be an even number. See *Cropping*.
4. To configure Logo Insertion, focus on the **Logo Insertion** section and do the following:
   - To enable the **Logo Insertion** section, select **Logo Insertion**. For logo insertion specifications, see *Logo Insertion*.
   - Open the **Logo Name** to select the required logo file. You need to upload logo files via the **Assets** tab. See *Uploading Logo Insertion Files*.
   - Open the **Position** list and select the required position for the logo: Top Left, Top Right, Bottom Left, Bottom Right.
   - In **Vertical Offset** and **Horizontal Offset**, select the required distance, respectively.
   - In **Transparency**, enter the required value, or move the slider.
5. Click **Done** to save the configuration and to close the dialog.

   The **New MBTS** button toggles to **Update MBTS**. You can click it and update the configuration of the profiles.
6. To send to device, click **Apply**.

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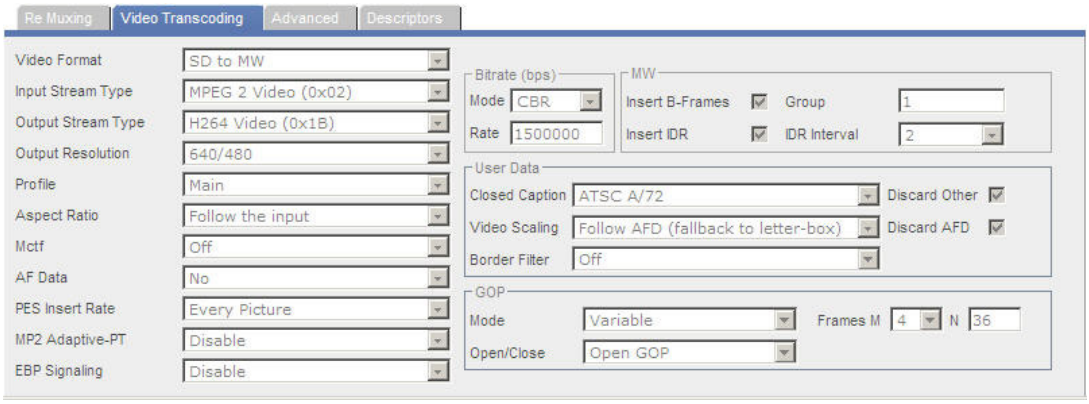
The multiscreen transcoding is configured via the **Multi Bitrate** page only. However, if you select in the Output section a multiscreen service, the Video Transcoding tab is disabled and appears as the following picture shows.

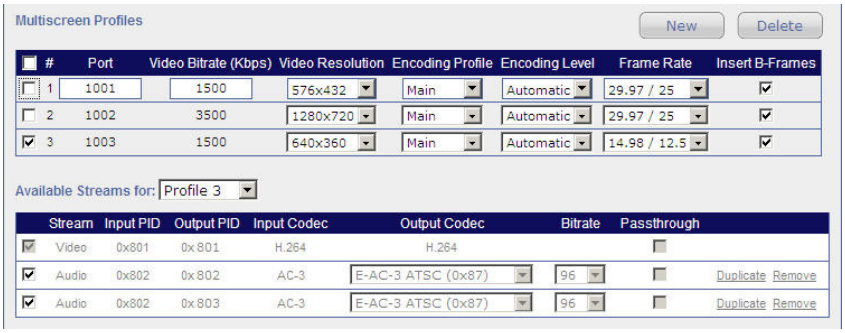


Duplicating Audio/Data Streams

You can transcode/passthrough each audio/data stream multiple times, with different output PID and transcoding parameters. You can also configure whether to enable each audio/data stream per specific MBTS Profile.

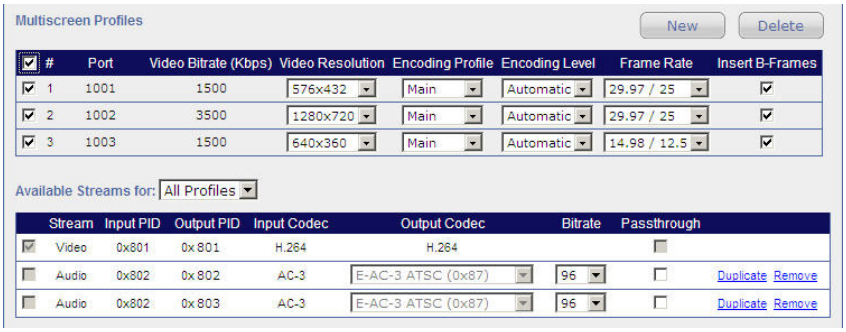
Each MBTS may have up to 25 streams.

Duplication of audio/data streams is done across all MBTS profiles. The Duplicate link is enabled, only once all MBTS profiles are selected as shown in the following figure.



Some MBTS profiles are selected

Duplication of stream is disabled



All MBTS profiles are selected

Duplication of stream is enabled

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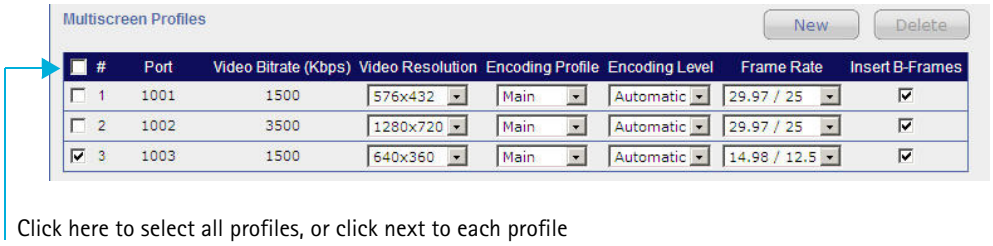
To duplicate a stream:

1. Select all configured profiles. Focus on the **Multiscreen Profiles** section and select all profiles by ticking the # box, or by ticking the number box next to each profile.



2. Click on the **Duplicate** link, to duplicate an audio or data stream.

   Once you have duplicated a stream, you can either duplicate it or remove it.
3. To associated the streams with a profile, select the required profile/profiles.

   By default, stream are associated to all profiles. To select the required profile, do either of the following:
   - In Multiscreen Profiles, select the required profile/profiles.
   - In Multiscreen Profiles, open the **Available Streams For** list and select the required stream.

Editing the Multiscreen Profiles List

To delete multiscreen profiles:

NOTE: Removing/adding a multiscreen stream from a profile is service affecting for all streams in the profile.

1. Select the **Stream Config** page.
2. In the Output section, drill down to the required MBTS service.
3. Click **Update MBTS**.
4. In the **Multiscreen Transport Stream** page, focus on the **Multiscreen Profiles** section.
5. Select the required profile to be removed. The **Delete** button is enabled.
6. Click **Delete**. The selected profile is removed from the MBTS.

NOTE: If you remove all profiles from an MBTS, the MBTS is deleted as well.

Uploading Logo Insertion Files

To upload a logo insertion file:

1. Select **Tools** > **Assets** page.
2. Click New.
3. Click Select a File, and browse to the required logo file.
4. Click Open.

   The required file is loaded and the Assets Management page is propagated with the loaded file.
5. Under Description, you can type a short description of the loaded file.

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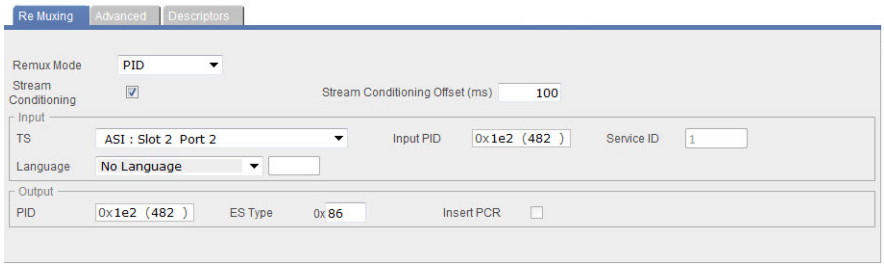
Stream Conditioning for DPI

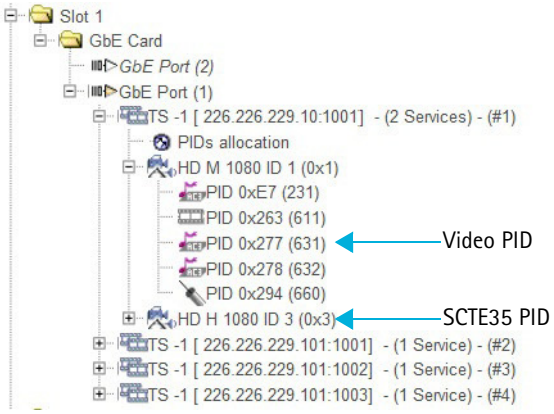
ProStream with ACE 5.2 and above supports stream conditioning to optimize the splice in/out points for downstream splicing. Stream conditioning, namely, GOP manipulation and VBV management on a video stream, is based on SCTE35 triggers.

ProStream also enables you to add a positive or negative offset in milliseconds to the stream conditioning location. This feature allows you to align preroll messages at the precise point of splicing. The offset value is applied to the PTS value which is taken from the SCTE35 message.



To configure MW stream conditioning:

1. In the **Output** section, drill down to the service with the transcoded video stream.



2. Select the SCTE35 PID in the **Re Muxing** tab.
3. In the **Stream Conditioning Offset (ms)** field, type the required offset value.

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Chapter 8
Deterministic SFN Re-multiplexing

DSR Terminology

Deterministic SFN Re-multiplexing network (DSR) is Harmonic's solution for seamless and cost effective insertion of regional programs in DVB-T SFN systems. For details, see the *DSR Application Note*.

Here are DSR related terms and their explanations:

- MIP - In a Single Frequency Network, transmitters and receivers are usually synchronized with others and use a GPS or a signal from the main station or network as a reference clock. DVB-T SFN systems use a special marker, the Mega-frame Initialization Packet (MIP) that is inserted in the bit stream at a central distribution point, and signals the SFN transmitters the absolute time, as read from a GPS receiver, at which this point in the data stream is to be broadcast.
- DSR Table - A table created by the ProStream 1000 device. This table includes information regarding the regional content and the integration of the regional content in the national TS. It is transmitted to the ProView 7000 device with the regional stream.
- National feed/stream - The stream received from the national headend. This is the main stream deriving the DSR activity. It is SFN compliant, that is, it includes MIPs.
- Regional feed/stream - The stream received from the regional headend. This stream is inserted in the national stream and transmitted as a DSR stream to the towers.
- DSR stream - The stream transmitted from the ProStream 1000 to the receivers on the towers. It includes the regional stream with DSR tables to allow SFN compatibility.
- DSFN - The output of the DSR system. This is the output national stream with the regional insertion transmitted by ProView 7000.
- DSR-link - Refers to the content streamed between the ProStream 1000 and the receiver only. Content marked as DSR-link is not included in the DSFN and is not transmitted out of the receiver. This content is required for CAS purposes.

Configuring the ProStream 1000

The main function of the ProStream 1000 in the DSR system is to create a transport stream that contains only the regional programs or specific regional data such as MHP or PSI/SI tables. This transport stream is precisely synchronized with the MIPs in the national TS.

The DSFN, the national stream transmitted at the final stage, should remain SFN compliant. Thus, the number of packets in the DSFN should be identical to the number of packets in the original national feed. In other words, ProStream 1000 must insert a packet for every packet it drops from the national and should not insert any additional packets.

DSR Specifications

The following table lists the DSR specifications:

Table 8-1: DSR Specifications

Item	Explanation
DSFN	A minimum of 100k colored nulls

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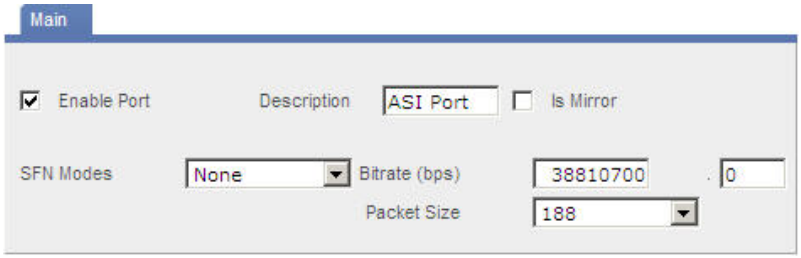
Table 8-1: DSR Specifications

Item	Explanation
Regional services	Up to 28 regional services can be inserted
DSR stream	Up to five DSR TSs per device Up to 100 national streams in a DSR TS Up to 100 regional streams in a DSR TS

To configure DSR:

1. Open the Web browser of the ProStream 1000.
2. Select the **Stream Config** tab.
3. Focus on the Output section.
4. Select the required ASI port and configure it.



5. Open the **SFN Modes** list and select DSR.

   The **National Input** list is populated with national incoming feeds.
6. Open the **National Input** list and select the required national feed. This TS is already an SFN stream with MIPs.
7. In **Reserved PIDs**, select the range of PIDs reserved for DSR data sent from ProStream to the ProView device.

   The default is up to 30 PIDs from the indicated PID. The default range is from 0x1FC0 - 0x1FDE.
8. Click **Apply**.
9. Select the required TS and select the DSR tab.
10. Configure according to the following:

    Replace National PAT - Select if you want to replace the original national PAT with a PAT generated by the ProStream 1000 device. It is recommended to select this option when you do one of the following:

    - Add/delete a service to the TS
    - Change the service ID
    - Change the PMT at ProView 7000 output, typically when using CAS

    Utilize Nulls Bitrate - Select this to use national nulls packets for local content insertion. You can select this option when the bitrate of the regional insertion is higher than the removed PIDs. For example, this is possible when the dropped service and/or the inserted service are VBR, or when the content of the regional insertion is different than the content of the national transport. The national channel does not include MHP services, while the regional insertion includes MHP services. As a result, the national bit-rate is ~3 Mbps while the bitrate of the regional insertion ~6 Mbps.

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Regional Delay (ms) - Enter, in milliseconds, the delay between the national MIP on the receiver side (ProView 7000) and the regional MIP on the ProStream 1000 side. To estimate the delay, use a modulator.

NOTE: The number of packets between the same pair of consecutive MIPs in the DSR stream and the DSFN output stream should be exactly the same as in the original stream.

Pass Reserved SI (0x2-0x1F) - when selected, ProStream 1000 asks the receiver to outflow the Specific Information (SI) tables as on national.

Force PVR DSR Off - when selected, ProStream 1000 asks the receivers to ignore the data in DSR table. Select this option when no regional content is inserted.

Create DSR-link CAT - select to create a CAT for the DSR-link. Select this option for CAS purposes.

11. In **Triggers for DSR Off on** ProView, configure triggers for disabling the DSFN and for outputting the original national TS from the ProView device.
    - National CC Errors - continuity counter errors on the input TS of the national TS
    - Local CC Error - continuity counter errors on at least one of the regional input TSs
    - Local Sync Loss - sync loss on at least one of the local input TSs

Scrambled Regional Content

To protect content transmitted to the towers, content may be scrambled. To allow regional insertion, you need to de-scramble the content. Usually there is a de-scrambler between ProStream 1000 and the receiver. Typically the devices that de-scramble do not correct the PMTs, that is, remove the CA descriptors. As a result, some set-top-boxes may consider the clear program as scrambled and may fail to display the program. To overcome this problem ProStream 1000 transmits two PMTs:

- Original local PMT that includes CA descriptors - the regional PAT points to the PMT with CA descriptor to enable de-scrambling.
- Duplicated PMT without CA descriptors - is included in the regional PAT with a different service ID. In this case, the PAT replaces the national PAT as an inserted local PID.

In terms of configuration, you need to take into account the bit-rate of the clear PMT in the calculation of the DSFN bit-rate.

Configuring the ProStream 1000 - Scrambled Regional Content

De-scramble the regional scrambled service and pass it to output:

The scrambled regional content is de-scrambled by a de-scrambler. The de-scrambler is between the ProStream 1000 and the receivers.

Provision the scrambled service twice:

- As a scrambled service:
  - Remove ECM
  - Change the PMT PID to the PMT PID of the replaced national service
  - Retain the original service ID and ESs IDs of the local service. Service ID should be according to the national PAT, national SDT in case it exists.
  - PMT should be in Create mode.
- As a scrambled service: with CA descriptors and ECMs with a different PMT.
- Configure the ECMs and PMTs to outflow to DSR-link only.

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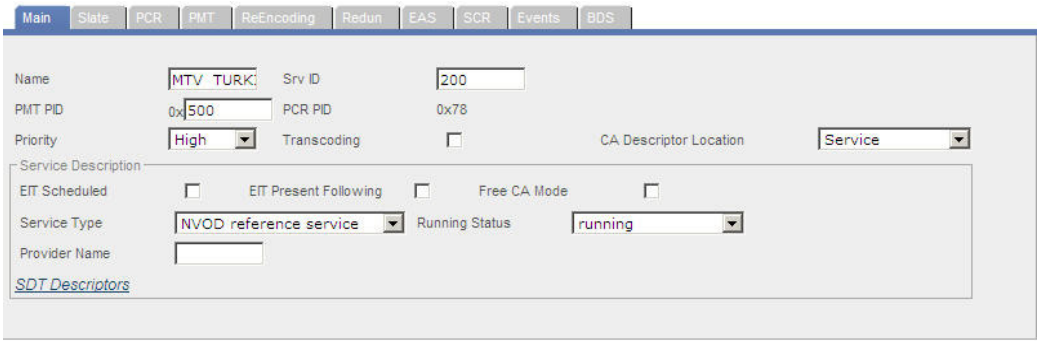
- Change the PMT PID. (no special requirements)
- Change service ID (no special requirements)
- Configure ECMs and PMT as DSR-link only. Thus these elements are ignored by the ProView device.
- Keep original ESs IDs

For instruction purposes only, assume you want to replace service ID 3000 with PMT PID 0x500 from the national TS with a scrambled regional service named MTV TURKIYE

Provisioning a Local Scrambled Service as a Scrambled Service

To provision a local scrambled service as a scrambled service:

1. Open the Web client of the ProStream 10000 device.
2. Select the **Stream Config** page.
3. Select the required ASI Port and in SFN mode, select DSR.
4. Select the required TS and select the DSR tab.
5. Verify that **Replace National PAT** is not selected.
6. Via the **Stream Config** page, provision the scrambled service, move it from the input to the required output.
7. In the output, select the required service.
8. Remove the ECMs.
9. Select the Main tab and in **PMT PID**, enter the PMT PID of the replaced national service. In this case, PMT PID 0x500:



10. Select the **PMT** tab.
11. In **PMT Generation Mode**, select **Create**.

Provisioning a Local Scrambled Service to be De-scrambled

To provision a local scrambled service to be de-scrambled:

1. Open the Web client of the ProStream 10000 device.
2. Select the **Stream Config** page.
3. Select the required ASI Port and in SFN mode, select **DSR**.
4. Select the required TS and select the DSR tab.
5. Verify that **Replace National PAT** is not selected.
6. Via the **Stream Config** page, provision the scrambled service, move it from the input to the required output.
7. In the output, select the required service.

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8. In the **Main** tab, change the PMT PID. In this case the PMT PID is 0x600.
9. In the **Main** tab, change the service ID. In this case the service ID is 200.
10. To pass the PMT to DSR-link only, in the **PMT** tab, select **DSR-link Only**.
11. To pass the ECM to DSR-link only, select the required ECM and in Advanced tab, select DSR-link only.

The de-scrambler, (IRD device), de-scrambles the scrambled service using the ECMs (and CA descriptor in it) that are provided.

To output a clear regional content, the receiver uses the original national PAT that points to the original PMT. The ProStream 1000 orders the receiver, to use the PMT of the regional content. This PMT points to the de-scrambled PIDs.

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Chapter 9
CAS

CAS Overview

The Conditional Access System (CAS) prevents unauthorized viewing of programs by scrambling services that later on can be decrypted using the correct decrypting key.

ProStream 1000 devices support the following CAS modes:

- DVB CSR scrambling - ProStream 1000 can be used as a DVB-CSA scrambler, over its ASI and GbE interfaces. ProStream 1000 is fully-integrated and certified to work with the following CA Systems:
  - NagraVision
  - NDS
  - Irdeto
  - Viaccess
  - Conax

  When working as a scrambler, the following options apply:
  - DVB encryption with external or internal EIS. See *Using Internal EIS*.
  - BISS - See *BISS Overview*.
- AES CBC scrambling - Available over the GbE output interfaces. It is certified to work only with NDS CAS. When working in this mode, the following feature is enabled:
  - Fixed key

Setting General CAS Parameters

CAS setup includes the following parameters:

- Set communication parameters between ProStream and EIS.
- Set the Crypto Period Duration.
- Set communication parameters between ProStream and ECMG.
- Allocate ECM PIDs.
- Set communication parameters between ProStream and EMMG.
- Allocate EMM PIDs.

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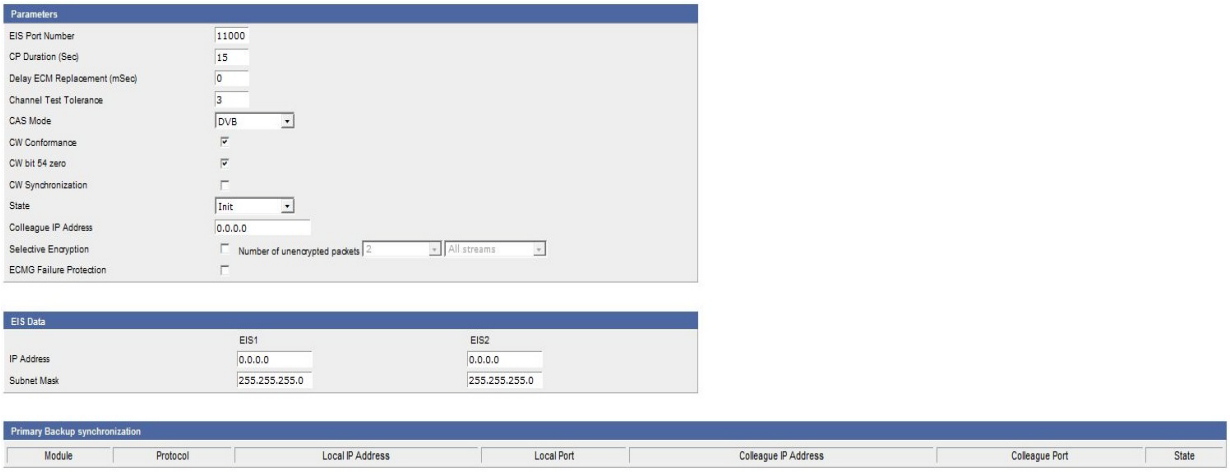
Main CAS Page



The Main CAS page enables you to set the CAS parameters. It enables you to configure the EIS and ProStream communication and the ECMG and ProStream communication.

To open the Main CAS page:

- In the Web page, select the **Simulcrypt Protocols** tab.

Setting CAS parameters

To set CAS parameters:

1. In **EIS Port Number** box, type the required value to set the TCP port through which ProStream communicates with the EIS. Valid values range between 1024 and 65535. The default value is 11000.

NOTE: ProStream 1000 acts as a server for the EIS device.

2. In the **CP Duration (Sec)** box, type the required value to set how often ProStream should change the encryption word, key. The Crypto Period is indicated in seconds and the valid range 5 - 7200.
3. Delay ECM Replacement (msec) - enter the required value to define the delay in msc of the ECM following a change of a Crypto Period.
4. In the **Channel Test Tolerance** box, type in the required value to define the allowed channel-tests before closing the connection with the ECMG. The default value is 3.
5. In **CAS Mode**, select one of the following options:
   - DVB - default option. CAS that supports the DVB protocol
   - AES CBC - CAS that supports the Advance Encryption Standard (AES) CBC protocol.
   - AES ECB - CAS that supports the Advance Encryption Standard (AES) protocol.
6. Select **CW Conformance** to allow CW conformance.
7. **CW Synchronization** - applies to NMX control mode. When checked, there is CW synchronization between the primary and backup device.
8. CW bit 45 Zero - By defaulted this option is not selected. When not selected, you the CW works with a a randomly created bit 54. When selected, the CW works with bit 54 set to zero.
9. In **State**, select one of the following:
   - Init - applies to NMX control mode only.

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- Primary - This device functions as the primary device for CAS purposes
- Backup - This device functions as the backup device for CAS purposes
- Standalone - This device works in standalone mode

10. In **Colleague IP Address**, enter the IP address of the backup CAS device.
11. In **Selective Encryption**, verify that the box is not selected.

    When selected, it allows trick mode of scrambled content. This option supports live ingests of channels such as nPVR, CathcUp TV and StartOver.
12. ECMG Failure Protection - By default it is off.

    When selected, whenever communication with one of the ECMGs fails, the device continues scrambling TS packets of the impacted SCG(s) using the last two control words, with new crypto-period number. For the faulty ECMG(s), the last ECM is transmitted, for other ECMG(s) the new received ECMs is transmitted.

NOTE: This mode does not support streams that are scrambled in negative delay start.

13. **Number of Unencrypted Packets** - enabled once you select **Selective Encryption**. Open the list and select the number of clear packets.
14. In **EIS Data**, enter the IP address and subnet mask of EIS1 and EIS2 as explained below:
    - In **IP Address**, enter the IP address of EIS1 and EIS2.
    - In **Subnet Mask**, enter the subnet mask of EIS1 and EIS2, respectively, to enable communication when the EIS is hooked to a network other than the CAS or the management network.

Viewing Communication Parameters between Primary and Backup

The primary and backup scramblers communicate via TCP. To view the communication parameters, focus on the Primary Backup Synchronization section.

The following table lists the parameters and explains them.

Table 9–1: TCP Communication

Parameter	Explanation
Module	Usually SCG appears to indicate that the ECM and CW are synchronized
Protocol	TCP, the communication protocol between the scramblers
Local IP Address	The IP address of the primary device over which it communicates with the backup device
Local Port	The port of the primary device over which it communicates with the backup device
Colleague IP Address	The IP address of the backup device over which it communicates with the primary device
Colleague Port	The port number of the backup device over which it communicates with the primary device
State	As per the Net Stat values

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Setting Communication Parameters Between ProStream and ECMG

To set communication parameters between ProStream and ECMG:

1. Select **Simulcrypt Protocols** > **ECMG** tab.Click **Add ECMG**, to add an ECMG.

   You can add up to 30 ECMGs.
2. Configure the ECMG according to the following parameters:
   - Name - Type in a name for the ECMG.
   - Priority - To enable redundancy, set priority by indicating the primary and secondary ECMG of the same SuperCAS ID.The ProStream always tries to connect first to the ECMG with the same SuperCAS ID and the highest priority and then to the next highest priority. Assign priority from 1-10 with 1 as the highest priority.
   - SuperCasID (hex) - A 32-bit identifier of the EIS provided by the CAS vendor.
   - Protocol Revision - Specify the mode of operation of the ECMG. Select revision 1, 2 or 3.
   - IP Address - Set the IP address of the ECMG. This IP address should be of the same subnet as the ETH2 IP address.
   - Subnet Mask - Set subnet mask for the ECMG. In case ECMG resides in a subnet other than the management or CAS subnets, set ECMG Subnet Mask to allow communication.
   - Port - set in decimal, the number of the ECMG TCP port used to connect the ECMG to the ProStream. The CAS vendor provides this value.
   - Channel ID - Set a unique number to define a unique ECMG.
   - Ext. CW - When selected, an external CW is used. Select this option in case the ECMG generates a CW.
   - Status - A read only filed which indicates the state of the connection. The connection state is either of the following:
     - Connected - ECMG and ProStream are communicating.
     - Disconnected - No connection is taking place at the moment.

TIP: Once you have set the CAS configuration and send configuration to the device, allocate the ECM PID.

   - Open Streams - The number of streams that are open for the ECMG.

Allocating ECM PIDs

When allocating ECM PIDs you actually define PIDs as ECM PIDs. This procedure is performed via the **Stream Config** page using the New ECM and New EMM buttons.

To allocate ECM PIDs:

1. Open the **Stream Config** page. (You can read/refresh input.)
2. Select the TS you wish to encrypt.
3. Select the **PID Allocation** icon.

   The New ECM or New EMM buttons appear.
4. Click **New ECM**, to create an ECM PID.

   An ECM PID appears with default ID, SuperCasID and PID number.
5. Select the new ECM PID to allocate it.
6. To allocate the ECM PID, fill in the following fields:
   - ECM ID - Type the ECM ID as provided by your CAS vendor. The ECM ID is a unique headend ID.

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- SuperCasID - A 32-bit identifier that contains the CAS ID and ECMG ID. The CAS vendor provides this value.
- PID - Type in the PID number you allocate for the ECM, in other words the PID that carries the ECM.
- Private Data - A string of up to 100 bytes that is added to the CA descriptor.
- PID Priority - Define the priority of the ECM PID in case of overflow. Priority values range from High to Low.
- Manage TID Independently - When selected, ProStream 1000 manages the ECM table ID independent of the CP (Control Period).

NOTE: A CA descriptor is automatically added.

Setting EMMG Parameters

The Entitlement Management Message Generator issues EMMs (Entitlement Management Messages) that carry private Control Access (CA) information as access permits to specific users, access revocations etc. When configuring the EMMG, you set communication parameters to establish communication between the ProStream and the EMMG. The configuration is done via the EMMG page.

Configuring EMMG

You can add up to 30 EMMGs.

To add an EMMG:

1. Select **Simulcrypt Protocols** tab > **EMMG**.
2. Click **Add EMMG**. You can add up to 20 EMMGs.
3. Add a row to the table for each EMMG that you want to configure. You can add up to ten EMMGs.
   - Configure the EMMG by filling in the EMMG table:
   - Del EMMG - Select the checkbox of the EMMG you want to delete.
   - ProStream Port - Enter the TCP port via which the ProStream communicates with the EMMG. ProStream supports up to five ports.
   - Client ID (hex) - Enter in hex. an identifier of the EMMG. The EMMG vendor provides this number.
   - IP Address - Type in the IP address of the EMMG.
   - Subnet Mask - Type in the subnet mask of the EMMG to enable communication when the EMMG is hooked to a subnet other than the management or CAS subnets.
   - Control - Specify whether the connection is TCP or broadcast. If you select broadcast, the Sect TS Packet field is enabled and you should select the required option.
   - Sect TS Packet - Enabled only if you select Broadcast under Control. The Sect TS Packet field defines the format of the EMM. The available formats are as follows:
     Section - The EMM is in MPEG-2 section format.
     Packet - The EMM is in MPEG-2 transport stream packet format.
   - Data ID - Enabled only if you select Broadcast under Control. Type in the data source identifier.
   - Data Format - Enabled only if you select Broadcast under Control. Allows to select either EMM or PDG data format.

TIP: Once you have configured the EMMG parameters, allocate EMM PIDs for the required TSs.

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Allocating EMM PIDs

When allocating EMM PIDs you actually define PIDs as EMM PIDs. This procedure is performed via the Stream Config screen and you can add an EMM in either of the following options:

- Under PID Allocation
- Moving a PID from the input to the output

To allocate EMM PIDs under PID allocation:

1. Select the **Stream Config** tab. (You may read/refresh input.)
2. Select the TS you wish to encrypt.
3. Select the PID Allocation icon.

   The **New ECM** and **New EMM** buttons appear.
4. Click **New EMM** to create an EMM PID.

   An EMM PID appears with default ID, Client ID and default PID number.
5. Select the new EMM PID to allocate it.
6. Fill in the following fields:
   - EMM ID - Type in the EMM ID as provided by your CAS vendor. The EMM ID is a unique headend ID.
   - Client ID- A four-byte integer that contains the CAS ID and EMMG identifier. The CAS vendor provides this value.
   - Backup Client ID
   - PID - Type in the PID number you allocate for the EMM, in other words the PID that carries the EMM.
   - Max Bitrate - Type in the maximum bitrate of the EMM.
   - Private Data - A string of up to 100 bytes that is added to the CA descriptor.

To stop sending EMM with the output stream, delete the EMM PID via the Stream Config page. Deleting EMMGs only (via the EMMG page) does not stop the EMMs from flowing with the output stream.

To allocate EMM PIDs using an input PID:

1. Select the **Stream Config** tab. (You can read/refresh input.)
2. Select the TS you want to encrypt.
3. In Input, select the required PID and click **Add to Output**.

   The PID appears underneath the selected output TS.
4. Click the newly moved PID.
5. To allocate the EMM PID, fill in the following fields:
   - EMM PID - Select to allocate the PID for the EMM, in other words the PID that carries the EMM.
   - CAS ID- A four-byte integer that contains the CAS ID and EMMG identifier. The CAS vendor provides this value.
   - Private Data - A string of up to 100 bytes that is automatically added to the CA descriptor in the CAT table. To create CAT, see *Provisioning the Output TS*.

   To stop sending EMM with the output stream, delete the EMM PID via the Stream Config page. Deleting EMMGs only (via the EMMG page) does not stop the EMMs from flowing with the output stream.

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Working with AES CAS Mode

When ProStream is descrambling using the AES protocol, the device is communicating with the CWS.

To define the communication parameters with the CWS:

1. In the Web page, select **Simulcrypt Protocols** > **CWSs**.
2. Click **Add CWs** to add a line to the table.
3. Configure the CW by filling in the following fields:
   - Name - The CWS name.
   - CAS ID 1, CAS ID 2 - The CAS IDs supplied by the CAS vendor.
   - Protocol Version - An 8-bit field identifying the protocol version to use when communicating with the CWS generator.
   - IP Address -. CWS IP address.
   - UDP Port - UDP port at which the CWS is listening and to which the ProStream connects.
   - Subnet Mask - CWS subnet mask.

To delete a CWS:

1. In the **CWS** table, select the **Del** check box of the CWS to be deleted.
2. Click **Del CWS**.

Monitoring ProStream CWS Communication

When ProStream is functioning as a de-scrambler, you can verify proper communication between the de-scrambler and the CWS by using the counters.

To monitor CSWS communication:

1. In the Web client select **Simulcrypt Protocols > CWSs**.
2. In the **CWSs** tab, click **Statistics**.

   A table appears and the button toggles to Close Statistics.
3. Click **Refresh** to view the most updated values.

   The values in the table are updated only once you click Refresh.
4. View the values of the columns and check that the number of the sent HB messages is as the received ones and that the number of the sent ECMs is as the received ones.
5. To have detailed information regarding the ECMs, click **Sockets Statistics**.

   A table appears and the button toggles to **Close Sockets Statistics**.
6. Click **Refresh Sockets** to view the most updated values.
7. View the socket and the number of sent ECM requests versus the number of received ones per socket.

Resetting Counters

Reset the counters for troubleshooting purposes only.

To reset the counters:

1. In the Web client select **Simulcrypt Protocols** > **CWSs**.
2. To reset the statistics counters, in the **CWSs** tab, click **Reset**.
3. To reset the sockets counters, in the **CWSs** tab, click **Reset Des. Counters**.

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Fixed Key

ProStream 1000 version 4.4 and up allows to scramble each socket with a different key to prevent mass de-scrambling by un-authorized viewers in the very rare cases that the keys are unveiled.

ProStream1000 supports a fixed Control Word (CW) scrambling of outgoing TS over IP. The Scrambling algorithm is based on AES and fixed CW.

System Specifications

Table 9–2: System Specifications

System	Specifications
ProStream 1000	Firmware version 04.04.003.001 and higher
ProStream 1000 Web client	IE 6.0 running on Win XP with SP2

Fixed Key Configuration

Before you start configuring the ProStream 1000 devices, do the following for both Scrambler and Descrambler:

- Verify firmware
- Clear configuration

Fixed Key Supported Firmware

Verify that the required firmware version is installed on the ProStream1000 devices.

To verify the firmware version:

1. Select the **Platform** tab. See *Setting Chassis Parameters*.
2. In **Back Panel View**, select **Chassis/Main card**.

   The **Chassis Properties** table appears.
3. In **Software Version**, verify that version 04.04.003.001 and up is indicated.

   If this version is not installed on the device, install the required version. See *Managing Software*.

Clearing Configuration

It is recommended to start the configuration of both scrambler and de-scrambler from scratch and not to rely on the previous configuration. To clear a configuration, see *To clear a configuration:*.

Defining CAS Mode

Both Scrambler and Descrambler should work in **AES CBC** mode. Changing the CAS mode requires device restart.

To set the required CAS mode:

1. Select **CAS** > **Main**.
2. Open the **CAS Mode** list and select **AES CBC** mode.
3. Click **Apply** and restart the device for the change in CAS mode to take effect.

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Defining a GbE Port

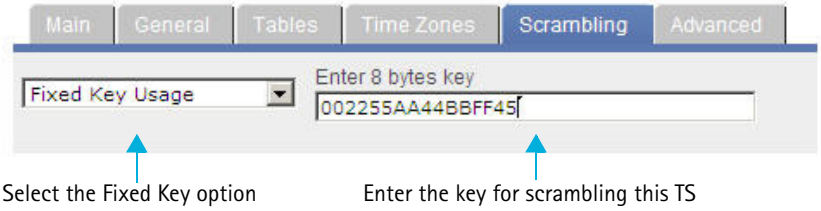
For details, see *Setting Up Input GbE Ports*.

Scrambler – Configuring TSs

Once you provisioned the Scrambler with the required transport streams and services (See *Output Configuration*), you can apply the fixed key feature to the required output TSs.

To apply the fixed key feature:

1. In **Output**, select the required TS.
2. In **Properties**, select the **Scrambling** tab.



3. Open the list and select **Fixed Key Usage**.
4. In the box that appears, enter the required fixed key.
5. Click **Apply**.

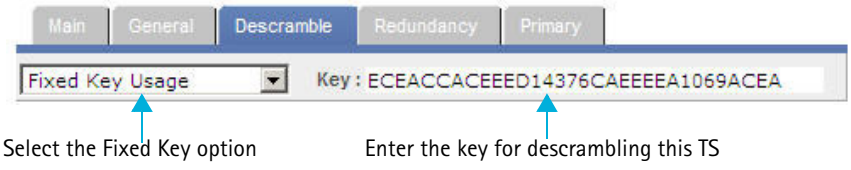
NOTE: The CW must consist of 32 hexadecimal characters. A shorter CW is ignored and a "0000..." CW is used.

Descrambler – Configuring the TSs

Once you have configured the input ports, enabled them and read the input information, (see *Setting Up Input GbE Ports*), you can apply the fixed key feature and descramble the TSs.

To configure the descrambler:

1. In Input, select the required TS.
2. Select the **Descrambling** tab.



3. Open the list and select **Fixed Key Usage**.
4. In the box that appears, enter the fixed key that was used for scrambling this TS.
5. Click **Apply**.

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Once the TS is descrambled, it appears as the following picture shows:

What's Next...

To start scrambling, activate your EIS to start issuing SCGs. If you do not have a vendor's EIS integrated in your CAS, you can use the Internal EIS.

Internal EIS

ProStream 1000 is furnished with an internal EIS and you can create, configure and send SCGs to scramble the required service or PID. ProStream 1000 allows to provision up to 200 SCGs.

An SCG request applies to a service or a PID and each SCG should be unique. The following table lists the required combined parameters for creating a unique SCG:

Table 9–3: SGC combination patterns

Data Type	SCG Components	Comments
Service	NID, TSID, SID, ECM ID	A single SCG may support multiple TSs, see *Step 6*. To select multiple TSs, select Multiple TS. In this case the services/PIDs of the output TSs with the selected ID, regardless of their NID (Network ID) appear in the Component List..
PID	NID, TSIN, PID, ECM ID	

Using Internal EIS

The following section instructs you on how to do the following:

- Define SCG components
- Associate an ECM with the SCG
- Send a provision

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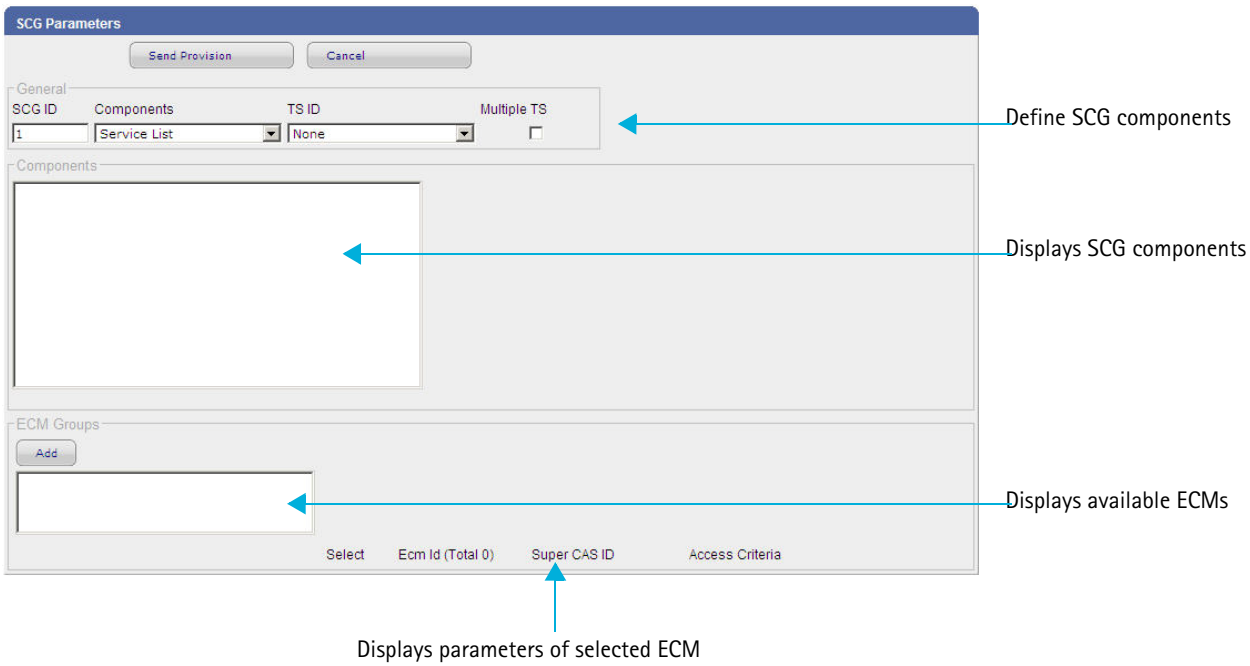
To use the internal EIS:

1. Select **Simulcrypt Protocols** > **Internal EIS** tab.

2. Click **Create New SCG**.

   The **New SCG** page appears.



3. In **SCG ID**, define the required SCG ID.
4. Open the **Component** list and select either of the following:

   Service List - The SCG refers to a service and once a TS is selected the Component section is populated with the services of the TS.

   PID List - The SCG refers to a PID and once a TS is selected the Component section is populated with the PIDs of the TS.
5. To select a TS, open the **TS ID** list and select the required TS.

   The Components and the ECM Groups sections are populated with the available services/PIDs and the allocated ECMs.
6. To select multiple TSs, select Multiple TS. In this case the services/PIDs of the output TSs with the selected ID, regardless of their NID (Network ID) appear in the Component List.

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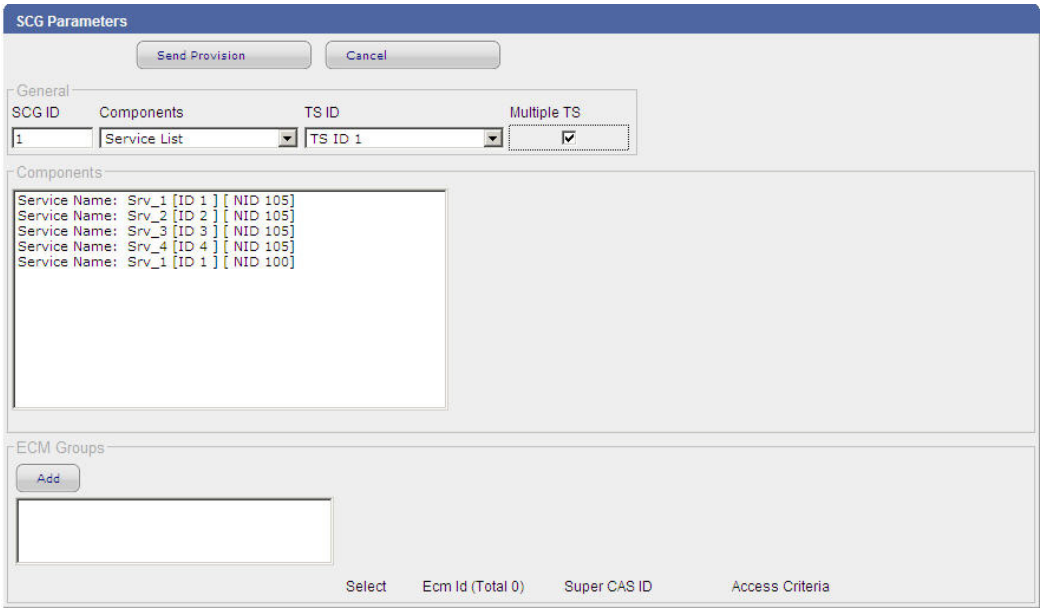
For example, if the selected TS ID = 1 and Multiple TS is selected, all the services of all output TS with ID 1 appear in the Component list, as the following picture shows:



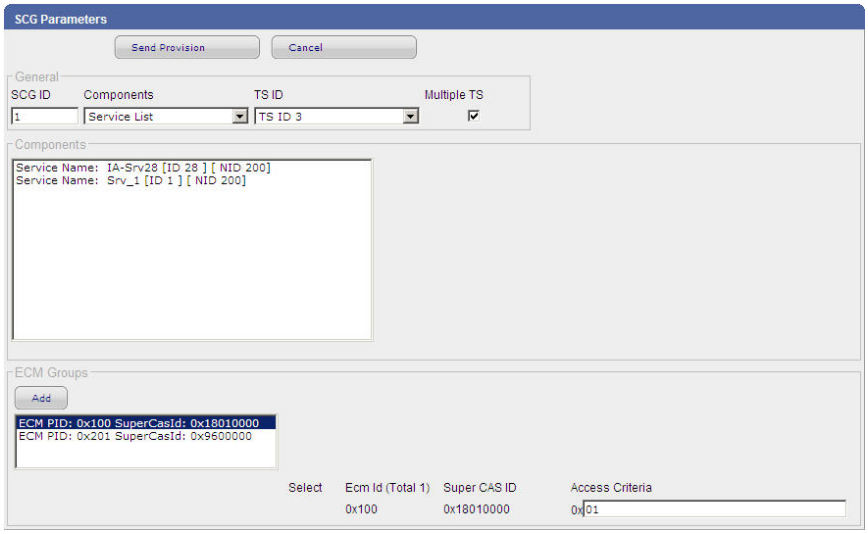
7. In Components, select the required service(s)/PID(s) to be scrambled.

NOTE: To select multiple components, press <Ctrl> while dragging/clicking your mouse.

8. To associate an ECM, in **ECM Groups**, select an ECM.
9. Click **Add**.

NOTE: You can add up to 30 ECMs per SCG.

A table appears and you can define the Access Criteria.



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TIP: You can delete an associated ECM by clicking, in the table, the required ECM and pressing the <**Delete**> key.

10. To send the SCG, click **Send Provision**.
11. In the confirmation message, click **OK**.The SCG Parameters page closes and Internal EIS page displays the provisioned SCG:

TIPs for SCG Table

The SCG table displays details of the sent SCGs:

- SCGID
- Network ID - if Multiple TS in selected Network ID is 0.
- TS ID
- Components - the components to be scrambled, either service(s) or PIDs
- List - shows the ID of the service(s)/PIDs to be scrambled by this SCG request.
- Number of ECM Groups - the number of associated ECM groups.

To create a new SCG:

- Do one of the following:
  - Click **Create New SCG**.
  - Click any where in the **Internal EIS** page and press the <**Insert**> key.

  The **SCG Parameters** page appears.

To edit an SCG:

- Do one of the following:
  - Click **Edit SCG**.
  - Double click the required SCG.

  The **SCG Parameters** page appears.

To delete an SCG:

NOTE: When you delete an SCG the service/PID turns to clear.Select the SCG(s) to be deleted.

- Do one of the following:
  - Click **Delete SCG(s)** and then click **OK**.
  - Select the SCG(s) to be deleted, press the <**Delete**> key, then click **OK**.

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BISS Overview

Basic Interoperable Scrambling System (BISS) is an open Standard for protecting digital contribution applications.

Digital contribution applications require the direct entry of a Session Word (SW) at the transmitter and receiver. The sender and receiver(s) of the transmission share the SW, and thus only the intended users receive the transmission. The Integrated Receiver Decoder (IRD) device can decode the content only if the SW is the same and complies with the BISS standard.

BISS supports the following modes of work:

- Mode 0 - No scrambling
- Mode 1 - Transmission is scrambled and a fixed clear SW is required for decoding.
- Mode E - Transmission is scrambled and a fixed encrypted SW is required for decoding.

BISS Specifications

Table 9–4: BISS Specifications

Specification	Explanation
ProStream 1000	Version 4.9 and up in standalone mode only
Supported BISS mode	BISS Mode 1 Note: BISS-E mode is currently unsupported.
Supported Interfaces	Output ASI and GbE ports
Scrambling component	■ Service level only ■ All ES components unless **Always Clear** is configured. See *Applying BISS with Clear PID(s)*.
IRD	PVR-2900

NOTE: ProStream 1000 version 4.9 and up does not decode the transmitted streams. Decoding is performed by the specified IRD.

Configuring BISS

NOTE: BISS is applied on a service level only.

To configure BISS:

1. Open the Web client of the device.
2. Select the **Symulcrypt Protocols** tab.

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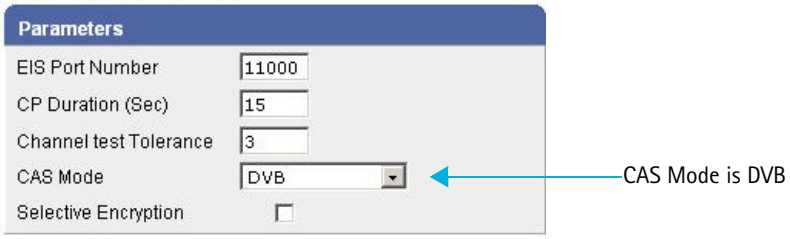
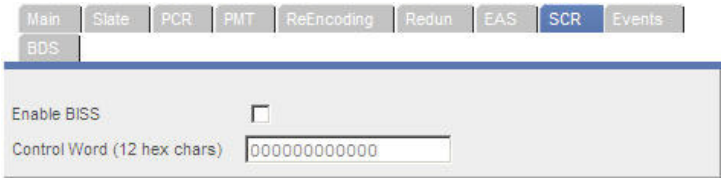


3. Verify that in **CAS mode** DVB is selected.
4. In output, select the required service.
5. Select the **SCR** tab.



6. Select **Enable BISS**.

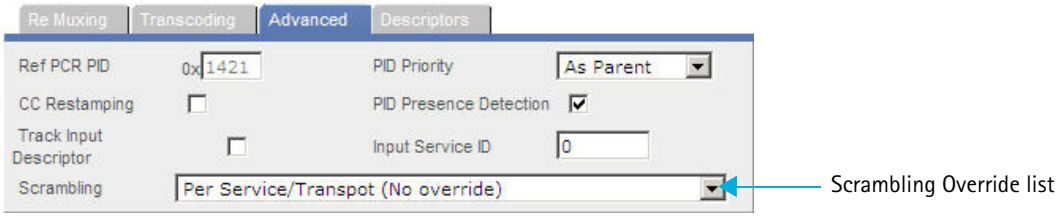
   The Control Word box is enabled.
7. Enter the required Control Word with up to 12 hexadecimal characters (six bytes).

   The CW is required for decoding the scrambled transmission.
8. Click **Done**.

Applying BISS with Clear PID(s)

To apply BISS with clear PIDs:

1. Select the **Stream Config** tab.
2. In Output, select the required PID.
3. Click **Advanced Options**.



4. Open the **Scrambling Override** list and select the required option:
   - Per Service/Transport No Override - Follows the scrambling configuration of the TS or service.
   - Always Scramble - Even if TS or service are not scrambled, the PID is scrambled as long as a fixed key or a CW is provided
   - Always Clear- Even if TS or service are scrambled, the PID is always clear.

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CA

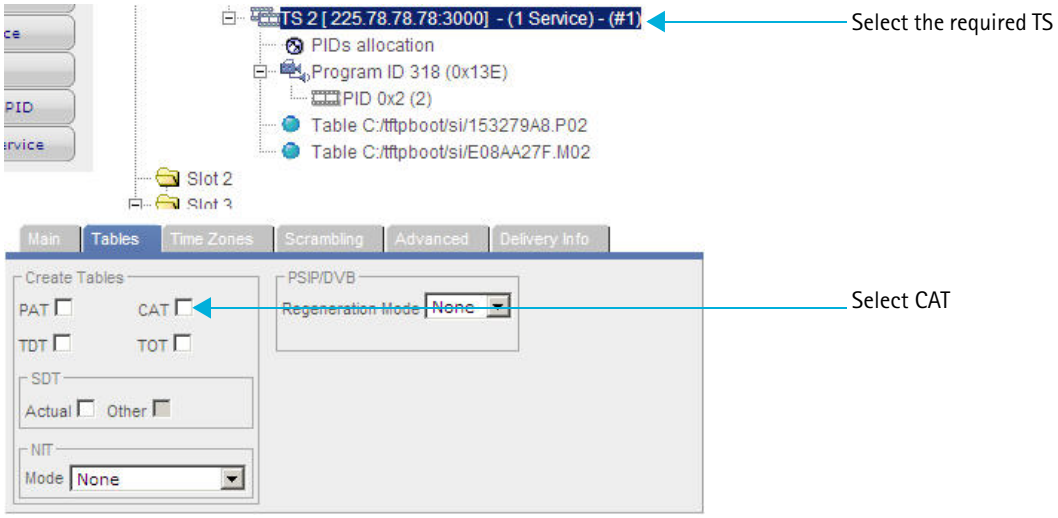
According to the BISS standard a CA descriptor must be present in the PMT to support BISS. ProStream 1000 automatically adds a CA descriptor when BISS is enabled. You can add more descriptors if required.

CAT

Verify that the Conditional Access Table (CAT) is enabled when BISS is enabled.

To enable CAT:

1. Select the required output TS.
2. Select the **Tables** tab.
3. Select **CAT**.



Viewing SCGs

To view SCGs:

1. Select the **Simulcrypt > SCGs** tab.

SCG ID	CP Number	Time To Next CP	TS ID	Service	PIDs	Activation Time	# ECMs	EIS	Configuration Match	State
1	3848	7 seconds	22	1		1/01/2009 1:00:00	1	Internal	OK	Scrambling OK

2. View the following parameters:
   - SCG ID - Unique identifier of the SCG
   - CP Number - Running counter of the number of Crypto Periods. It indicates the number of times the ECM has been changed for this stream.
   - Time to Next CP - Indicates how often the ECM is changing for this stream.
   - TS ID - Stream that carries the service to be encrypted as sent by the EIS.
   - Service - ID of the program/service being scrambled using the specific SCG.
   - PIDs - If PIDs are scrambled, indicates the scrambled PIDs.
   - Activation Time - Activation time of this configuration.

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- # ECMs - Number of associated ECMs.
- EIS - Whether internal or not.
- Configuration Match - Whether the SCG and ECM configuration is identical to the ECM PID allocation.
- State - Whether scrambling is successful or not.

Using a PSIG Device

When using a Program Specific Information Generator (PSIG) device, use the PSIG page. The PSIG interfaces with the ProStream device to receive information required for building the PSI tables and for injecting them to the ProStream 1000 device.

To work with PSIG:

1. Select **Simulcrypt Protocols** > **PSIG** tab.
2. In **Active Network**, select Enabled and the required enabled network to communicate with the PSIG. Select either Management or CAS.
3. In **Timeout Tolerance**, enter the required retrials for establishing communication with the PSIG.

To add a PSIG:

1. Click **Add PSIG**.
2. Enter the following parameters:
   - TCP Port - TCP port number over which the ProStream device communicates with the PSIG.
   - Channel Test Interval (msec) - Required testing interval.
   - IP Address - IP address of the PSIG.
   - Subnet Mask - Required subnet mask.

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In the event of a malfunction, the following events take place:

Table 10–1: Malfunction Reaction

Object	Reaction
Front panel	The alarm LED is illuminated in red.
Web client	■ The alarm icon turns red. ■ The number of active alarms is updated. ■ A message appears notifying you of the nature of the problem.

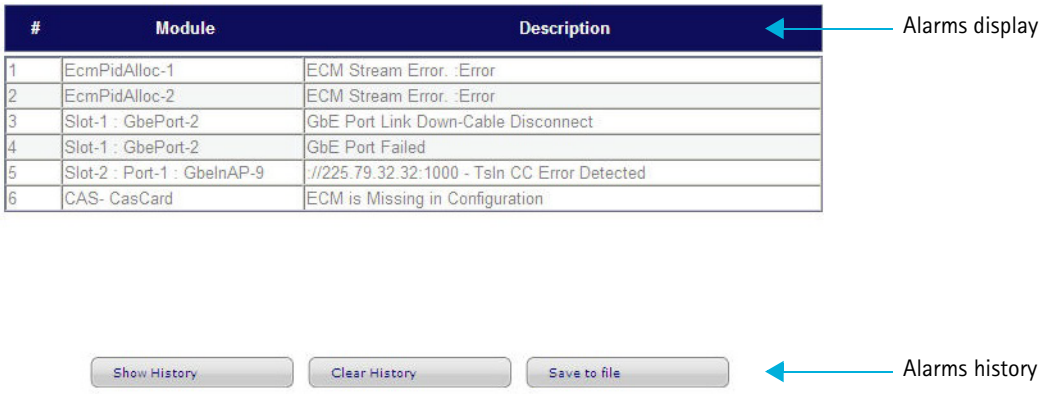
Viewing Alarms

You can view the alarms via the Status page. This page also enables you to view the Alarm log and to save it as an XML file.

To view alarms:

1. Do one of the following:
   - ❑ In the title bar, click the **Active Alarms** link.
   - ❑ In the Web client, select **Status**.

   The **Status** page appears:



The Status page includes the following two sections:

- Alarms Display
- Alarms History

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Alarms Display

The Alarm display lists the alarms in a chronological order. The topmost alarm in the list is the latest alarm to be registered. The Alarm display provides the following information:

Table 10–2: Alarm Display

Parameter	Explanation
#	A sequential number that indicates the chronological order according to which the alarms are registered.
Module	Faulty object that caused the alarm
Description	Describes the fault that invoked the alarm

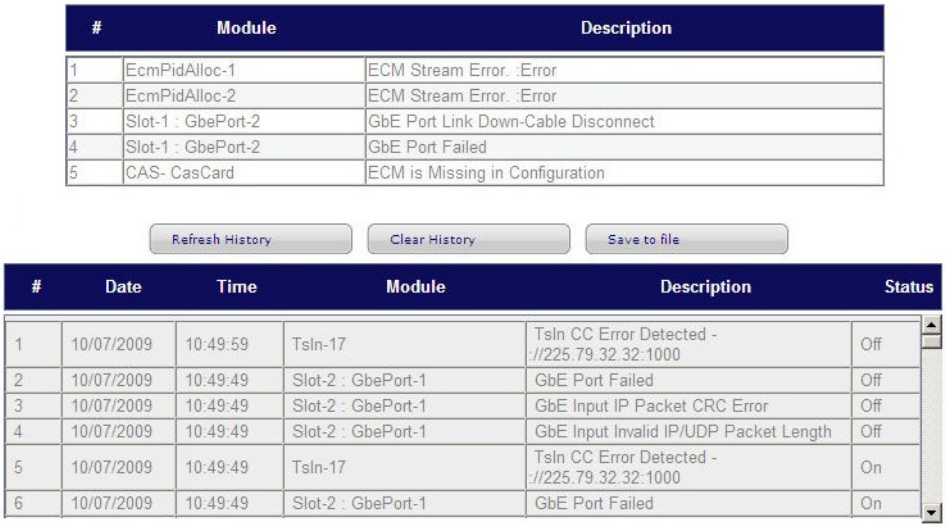
Alarms History

The Alarms History section displays in a chronological order alarms that occurred up to the time you generated the log. To view an updated log, refresh the log. You may view, refresh, clear and save the log.

To view the alarm log:

1. In the **Status** page, click **Show History**.

   In the Alarm History section a log appears and **Show History** toggles to **Refresh History**:



#	Module	Description
1	EcmPidAlloc-1	ECM Stream Error. :Error
2	EcmPidAlloc-2	ECM Stream Error. :Error
3	Slot-1 : GbePort-2	GbE Port Link Down-Cable Disconnect
4	Slot-1 : GbePort-2	GbE Port Failed
5	CAS- CasCard	ECM is Missing in Configuration

#	Date	Time	Module	Description	Status
1	10/07/2009	10:49:59	TsIn-17	TsIn CC Error Detected - //225.79.32.32:1000	Off
2	10/07/2009	10:49:49	Slot-2 : GbePort-1	GbE Port Failed	Off
3	10/07/2009	10:49:49	Slot-2 : GbePort-1	GbE Input IP Packet CRC Error	Off
4	10/07/2009	10:49:49	Slot-2 : GbePort-1	GbE Input Invalid IP/UDP Packet Length	Off
5	10/07/2009	10:49:49	TsIn-17	TsIn CC Error Detected - //225.79.32.32:1000	On
6	10/07/2009	10:49:49	Slot-2 : GbePort-1	GbE Port Failed	On

2. View the log.

   It displays the alarms registered up to the time you generated the log and informs you of the following:

Table 10–3: Alarm History

Parameter	Explanation
#	Index number of the alarm.
Date	Date on which the alarm was registered

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Table 10–3: Alarm History

Parameter	Explanation
Time	Time at which the alarm was registered
Module	Faulty component
Description	Describes the fault that invoked the alarm
Status	Indicates whether the alarm is on or off

To refresh the log:

Because the Alarm log displays the alarms up to the time you generated the log, refresh it to view an updated log:

- In the Alarm screen, click **Refresh History**.

  The log is updated to display the latest alarms.

To clear the log:

- In the **Status** page, click **Clear History**.

  The currently displayed log disappears. Once you click Refresh History, a new log is generated. It includes alarms registered since the last clear log.

To save the log to a file:

1. In the Alarm screen, click **Save to File**.
2. Select a location for saving the file and click **Save**.

   The log is saved as an .XML log in the location of your choice.

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Chapter 11
Troubleshooting

Troubleshooting

The following tables describe alarm messages, their probable cause and possible solutions. The alarms are arranged according to their source object.

Table 11–1: Alarm List Raised by Platforms

Alarm Message	Description	Solution
CPC Card HW Failure	An essential component of the card is faulty.	Power-off the device and call Customer Support.
CPC Card Temp. Sense Exceed Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, call Customer Support.
CPC Card Voltage Error	Inappropriate power supply for CPC card.	Power-off the device and call Customer Support.
Got New Configuration	Indicative alarm that appears in History log only. Indicates a change in the configuration.	N/A
NTP Connection Failure	Connection to NTP failed or lost.	■ Check Ethernet link on Ethernet port 3. ■ Check NTP server definitions.
Front Panel Not Present	Front panel malfunction.	Call Customer Support
Failure Generating CW	The CWS (Control Word Server) does not successfully generate CW.	Power down and power up the CWS.
Multiple NMX Connected - IP Address 1, IP Address 2	More than one NMX is controlling the device.	Use only one NMX to control the device.
Platform Change to be Backup	Indicative alarm that the unit configuration has changed and currently it is configured as a backup device.	N/A
Platform Change to be Primary	Indicative alarm that the unit configuration has changed and currently it is configured as a primary device.	N/A

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Table 11–1: Alarm List Raised by Platforms

Alarm Message	Description	Solution
DT Mux Priority Changed	Indicative alarm remitted when a redundancy switch has taken place. Therefore, the DT MUX priority was changed.	N/A
Platform Initializing	Indicative alarm that appears in History log only.	N/A
Auto-Negotiation Failed: management network	The handshake protocol with the switch failed.	Reconfigure the switch to use auto-negotiation settings.
Auto-Negotiation Failed: CAS network	The handshake protocol with the switch failed.	Reconfigure the switch to use auto-negotiation settings.
Could not Reserve Max Splice Engines	The device could not reserve maximum splice engines to splice services.	Check how many spliceable services were configured and remove unnecessary services
Reset Required after Successful DL	The required firmware is ready. Reset the device to boot up with the new firmware.	Reset the device.
Background Download in Progress	Background download in progress.	N/A
Background Download in Progress - Retry	Indicative alarm. Background download in progress.	N/A
Background Download Failed - TFTP Error	Background download failed due to TFTP error.	Check that the TFTP server is up and running. Zap the device.
Background Download Failed - Disk Full	Background download failed because the disk is full.	Remove previous firmware files to free up space.
Background Download Failed - Error	Background download failed.	Check that the TFTP server is up and running. Zap the device.
Background Download Canceled	Background Download was canceled.	Reboot the device or retry to download firmware.

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Table 11–1: Alarm List Raised by Platforms

Alarm Message	Description	Solution
Reserved BR in Safe Mode	At least one of the DiviTrack pools was configured to enable the reservation of pool bitrate. When this is true, the Multiplexer expects the reserved bitrate client to communicate with it at least once every 5 seconds. This term was not fulfilled, so the actual reserved bitrate for every DiviTrack pool is the maximum configured bitrate.	Contact Customer Support.
License Grace Period Enabled	A licensed feature has been used without a license. You have a grace period of 45 days to use this feature and to purchase a license for it.	Purchase the license for the feature.
License Expired	License has reached its expiration date.	Purchase the required license.
License General Failure	An internal licensing failure is detected.	■ Restart the device. ■ If problem persists, call Customer Support.
No available Backup	Raised by primary when there is no available backup device in the group, that is, a standby backup (in active), with valid configuration and without DRT.	Check the backup device for: ■ Connectivity ■ Valid configuration ■ Whether it is already active
No Primary Available	Raised by backup whether active or inactive, when primary has DRT or does not send any HHP. If primary is running and is active, backup does not raise the alarm.	Check primary.
No HHP Traffic on HHP Channel	No redundancy messages are detected on message port. Usually occurs when video is streamed to the redundancy multicast network.	■ Check other multicasts on the network (video or other). ■ For quick validation, change the MCast:port of the HHP and check whether alarm is remitted
Backup Device Is Active	Raised by backup when active.	Swap between primary and backup.
Primary Device Inactive	Raised by primary when inactive.	Check primary. If fixed, switch back to primary.

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Table 11–1: Alarm List Raised by Platforms

Alarm Message	Description	Solution
Fail To Sync	Raised by backup when it fails to get primary's configuration.	■ Check primary connectivity (the sync can be only on the management network). ■ Check backup connectivity.
Duplicate GID/ SGID	Raised by primary if other primary device in the group is detected with same SGID. For 1:1 scheme, you cannot configure the SGID - the alarm is raised if more than one primary is configured with the same group ID.	Check for primary devices with same Group ID.
Group Redundancy Mode Mismatch	Raised by any device which detects a group device member with a different redundancy mode.	Change the configuration for all devices to have the same redundancy mode.
Missing HHP Messages	At least one port does not receive HHP messages.	

Table 11–2: Alarm List Raised by Slot

Alarm Message	Description	Solution
Card Mismatch	The detected card is not as configured.	Verify that the appropriate card is mounted in the slot.
Card Missing	The configured card is not detected in the slot.	1. Verify that the card is mounted in the slot. 2. Verify that the card is secured to the slot. 3. If problem persists, replace card.

Table 11–3: Alarm List Raised by ASI Card

Alarm Message	Description	Solution
ASI Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM.

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Table 11-3: Alarm List Raised by ASI Card

Alarm Message	Description	Solution
ASI Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
ASI Card HW Failure	An essential component of the card is faulty.	Replace card.
ASI Card Initializing	An essential card error.	Replace card.

Table 11-4: Alarm Raised by ASI Scr Card

Alarm Message	Description	Solution
ASI Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM.
ASI Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
ASI Card HW Failure	An essential component of the card is faulty.	Replace card.
ASI Card Initializing	An essential card error.	Replace card.

Table 11-5: Alarm Raised by 8VSP Card

Alarm Message	Description	Solution
Meteor Card Initializing	An essential card error.	Replace card.
Meteor Card HW Failure	An essential component of the card is faulty.	Replace card.
Meteor Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the card.

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Table 11-5: Alarm Raised by 8VSP Card

Alarm Message	Description	Solution
Meteor Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.

Table 11-6: Alarm Raised by 8VSB Port

Alarm Message	Description	Solution
Meteor Demodulator Reset	No RF input is detected.	check RF input.

Table 11-7: Alarm List Raised by DSR

Alarm Message	Description	Solution
DSR National Sync Loss	National input TS sync loss	Check national source.
DSR National CC Errors	National input continuity counter errors	Check national source.
DSR Regional Sync Loss	Regional input TS sync loss	Check regional source.
DSR Regional CC Errors	Regional input TS continuity counter errors	Check regional source.
DSR MIP Missing	MIP PID is missing on input	Check national TS.
DSR ProView Off	DSR mode on the ProView is off	N/A

Table 11-8: Alarm List Raised by ReEncoding Card

Alarm Message	Description	Solution
ReEnc Card Initializing	Indicative alarm that appears in History log only.	N/A
ReEnc Card Failure	The recoding unit crashed resulting from an unknown error, or the input video stream is not MPEG compliant.	Check the input stream.

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Table 11-8: Alarm List Raised by ReEncoding Card

Alarm Message	Description	Solution
ReEnc Card Temp. Sense Exceed Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, call Customer Support.
ReEnc Card Voltage Error	Inappropriate power supply of ReEncoding card.	■ Replace card. ■ If more than one card issues the alarm, call Customer Support.

Table 11-9: Alarm List Raised by ReEncoding Engine

Alarm	Description	Solution
MTS FPGA Signal Loss (from SBP)	ReEncoding engine internal error.	Call Customer Support.
MTS FPGA Sync Loss (from SBP)	ReEncoding engine internal error.	Call Customer Support.
MTS FPGA Output Overflow (to BIO)	ReEncoding engine internal error.	Call Customer Support.

Table 11-10: Alarm List Raised by Transcoding Card

Alarm	Description	Solution
Transcoding Card Initializing	Indicative alarm that appears in History log only.	N/A
Transcoding Card Failure	The transcoding card crashed resulting from an unknown error.	Call Customer Support.
Transcoding Card is Not Supported by HW Model	The device RAM is less than 1G.	Call Customer Support.
Transcoding Card Temp. Sense Exceed Limits	The card is overheating	Call Customer Support.
Transcoding Card Voltage Error	Inappropriate power supply of transcoding card.	Call Customer Support.

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Table 11-11: Alarm List Raised by Transcoding Engine

Alarm	Description	Solution
TransEngine FPGA Output Overflow	Transcoding engine internal fault.	Call Customer Support.
Loss of Input TS (no nulls)	Transcoding engine internal fault.	Call Customer Support.
TransEngine Application Error (no output)	Transcoding engine internal fault.	Call Customer Support.
Host-TransEngine Sync Error (Time Change)	Transcoding engine internal fault.	Call Customer Support.
TS RX Overflow Error	Transcoding engine internal fault.	Call Customer Support.
TS TX Underflow Error	Transcoding engine internal fault.	Call Customer Support.
Audio DSP - Communication Failure	Transcoding engine internal fault.	Call Customer Support.
Audio DSP - Core Failure	Transcoding engine internal fault.	Call Customer Support.
Audio DSP - System Failure	Transcoding engine internal fault.	Internal problem. If problem persists, call Customer Support.
Audio DSP - Not enough resources	Transcoding engine internal fault.	Check that configuration meets spec.
License Transcoding Missing	No license for transcoding and Grace period has expired.	Purchase the required license.
License PIP Missing	No license for PIP and Grace period has expired.	Purchase the required license.
License Audio Level Missing	No license for ALM and Grace period has expired.	Purchase the required license.

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Table 11-12: Alarm List Raised by GbEPro Card

Alarm Message	Description	Solution
GbE Card Sensed Temp Exceeds Limits	The card is overheating.	■ Check for proper operation of the cooling fans. ■ Power-off the device. ■ Ensure that the air filters are clean. ■ If alarm persists, replace the IOM.
GbE Card HW Failure	An essential component of the card is faulty.	Replace card.
GbE Card Initializing	An essential card error.	Replace card.
GbE Card Sensed Temp. Exceeds Limit	The card is overheating	Replace card.
GbE Card Voltage Error	Inappropriate power supply of GbE card.	Replace card. If more than one card issues the alarm, call Customer Support.
GbE Output Multicast Buffer Overflow	Too many identical PIDs are output through the same IOM card.	Reduce the number of multicast PIDs.
GbE Input Descrambling Bitrate Exceeded	The input traffic buffer overflowed.	Check the input bitrate.
GbE Card Input Data Loss	An internal data error in the GbE IOM card.	Reassign the GbE IOM.
Pacer Clock Error	An internal error in the GbE IOM card.	Reassign the GbE IOM.
GbE Flash Upgrade in Process	A notification message during the upgrade of the GbE IOM firmware.	N/A

Table 11-13: Alarm Raised by GbE Port

Alarm Message	Description	Solution
GbE Auto-Negotiation Failed	The handshake protocol with the switch failed.	Check switch.

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Table 11-13: Alarm Raised by GbE Port

Alarm Message	Description	Solution
GbE Input Error	Input GBE port general failure.	1. Verify that an SFP is installed in the port. 2. Check the physical connection between the port and the switch. 3. Check the validity of the GbE port configuration and that it matches the network definitions.
GbE Input IP Packet CRC Error	At least one IP packet has a CRC error.	Check the switch, fiber, and SFP connections.
GbE Input IP Packet Missing	At least one IP packet is missing	Check the switch, fiber, and SFP connections.
GbE Input Non MPEG Buffer Overflow	Management traffic on the GbE network port exceeds the port's capacity.	Look for sources with excessive management traffic.
GbE Input Inter Packet Gap Too Small	The Inter Packet Gap is below 12 ticks.	Check source.
GbE Input Invalid IP/UDP Packet Length	The payload length of an input IP/UDP packet is not divisible by 188 bytes (standard length of an MPEG packet)	Check source.
GbE Link Down - Cable Disconnect	The Gigabit Ethernet port is down.	Connect the cable.
GbE Port Failed	The GbE port link is down.	Check the link for connectivity.
GbE Output MPEG Buffer Overflow	FIFO overrun causes data to be dropped and might cause decoding problems.	Standalone - reset the module. If it does not remit the alarm, contact Customer Support.
GbE SFP Missing	The SFP connector is missing from the GbE port.	Check that the SFP connector is fully inserted.
GbE Slave Channel Activated	In port redundancy, the backup port is active	None.

Table 11-14: Alarm Raised by GbE In Access Point

Alarm Message	Description	Solution
GbE Input Backup Socket Not Active	No data is detected in the backup input socket.	Verify the socket is correctly defined and is streamed to the device.
GbE Input Primary Socket Not Active	No data is detected in the primary input socket.	Verify the socket is correctly defined and is streamed to the device.

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Table 11-14: Alarm Raised by GbE In Access Point

Alarm Message	Description	Solution
GbE Input Socket Buffer Overflow	Input bitrate exceeds estimated bitrate.	Check source.
Invalid Source Clock Frequency	Source clock frequency breaches the MPEG specifications	Check source.
GbE Input Socket Lost	For more than 100ms, no PCR has been detected at input socket.	Check source.
GbE Input Socket Erred	discontinuity with no Discontinuity indicator.	Check source.
GbE Input Socket CBR Rate Changed	Detects a change in the bitrate of an MPTS. The MPTS must be a CBR stream.	Check source.
GbE Input Socket Max. Jitter Exceeded	An MPTS socket is not CBR.	Check source.
GbE Input Socket Timestamp Error	The order of the transport stream packets inside the IP packet is wrong.	In most cases, this is a momentary alarm. If this alarm is not remitted, check the network.
Failed to Receive CW for the Service	The descrambler does not successfully receive a CW response for the service from the CWS (Control Word Server).	Check that the CWS is alive and communication cables are connected.
Invalid Response from CWS	There are problems in communication between the descrambler and CWS.	Check that the CWS is alive and communication cables are connected.
Missing ECM	No ECM was extracted from PMT for the scrambled service.	The scrambler does not send ECM to the descrambler. Check scrambler configuration.
Missing CA Information	There is no CA information for the descrambled service.	The CA descriptor is missing. Check the scrambler configuration.
Undefined Scrambling Algorithm	There is no AES descriptor in the PMT.	The descrambler tries to descramble the service. The scrambler adds a CAS Mode descriptor to the PMT.
Unsupported Scrambling Algorithm	The scrambling descriptor is not AES-NSA.	In this case, the descrambler tries to descramble the service. The scrambler adds a scrambling descriptor with an AES-NSA value to the PMT.

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Table 11-14: Alarm Raised by GbE In Access Point

Alarm Message	Description	Solution
Encoder's Clock Not Synced to Mux	The clock of the encoder is not synchronized with the clock of the multiplexer.	Check the schedule format against the specification.
GbE Input Primary Socket-PAT Missing	PAT is missing in the primary socket for a longer period than the configured failover time.	Check source.
GbE Input Backup Socket-PAT Missing	PAT is missing in the backup socket for a longer period than the configured failover time	Check source.
Missing PMT		
Missing Backup PMT		
GbE Backup Socket Activated	With socket redundancy configured, the currently selected source is the backup transport. Backup source is selected In Manual mode. Backup source is selected or active in Automatic mode when the primary source failed	None.
Queue Depth Threshold Passed	The allocated buffer reaches the predefined fullness (50%).	Check bitrate configuration in the input data socket.
GbE Input Primary Socket - A/V Missing	With access point/socket/ service-level redundancy configured, the primary transport failed.	1. Check the GbE input for link and activity. 2. Check that the IP and UDP are flowing to the port. 3. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).
GbE Input Backup Socket - A/V Missing	With access point/socket/ service-level redundancy configured, the primary transport failed.	1. Check the GbE input for link and activity. 2. Check that the IP and UDP are indeed flowing to the port. 3. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).
DiviTrack Upstream Problem	Connectivity problem between the DiviTrack controller and the encoder.	Check the connectivity between the device and the encoder.
DiviTrack Downstream Problem	Connectivity problem between the encoder and the DiviTrack controller.	Check the connectivity between the device and the encoder.

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Table 11-14: Alarm Raised by GbE In Access Point

Alarm Message	Description	Solution
GbE Socket Failed	With access point/socket/ service-level redundancy configured, both the primary and the backup transports have failed.	1. Check that the IP and UDP are indeed flowing to the port. 2. Check that the IP and UDP do not create a conflict with other sockets (same 32 lower bits).
PSIP Tables Missing	PSIP Master Guide Table (MGT) was lost.	Recheck the connection and extraction settings.

Table 11-15: Alarm Raised by 8VSB In Access Point

Alarm Message	Description	Solution
Meteor Weak Signal/Loss of Sync	No RF input is detected.	Check RF input
Meteor Packet Error Rate Threshold Exceeded	Problematic RF signal.	Check support Meteor page to get the actual instantaneous packet error rate value.
Meteor Signal Quality (SNR) Below Threshold	Problematic RF signal.	Check support Meteor page to get the actual signal quality value.

Table 11-16: Alarm Raised by GbE Out Access Point

Alarm Message	Description	Solution
GbE Output Socket Not Transmitted	Cannot get MAC address of the destination in unicast mode.	Check IP connectivity to destination.
GbE Output Socket - Unreachable Destination	Cannot get an updated destination MAC address. Output is sent to the last known MAC address (in unicast mode).	Check IP connectivity to destination.
GbE Output Socket - Buffer Overflow Level = High	The actual bitrate of the GbE output socket exceeds the configured output bitrate	Delete services from the alarmed TS until the bitrate stabilizes and the alarm is remitted or redefine bitrate for this socket.
GbE Output Socket - Buffer Overflow Level = Normal	Because of PID priority, some PIDs from Normal priority are dropped.	Information only.
GbE Output Socket - Buffer Overflow Level = Medium	Because of PID priority, some PIDs from Medium priority are dropped.	Information only

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Table 11-16: Alarm Raised by GbE Out Access Point

Alarm Message	Description	Solution
GbE Output Socket - Buffer Overflow Level = Low	Because of PID priority, some PIDs from Low priority are dropped.	Information only.
Invalid CAS Mode	An invalid CAS mode is detected	Set the correct CAS mode.
DVB Regen. Not Supported by this HW Model	DVB Regenerations Not Supported.	This HW model does not support this feature.

Table 11-17: Alarm Raised by TsIn

Alarm Message	Description	Solution
TsIn CC Error Detected	The splicer detected a continuity counter error on the transport stream input.	None.
TsIn MPEG Sync Loss	The port has lost sync with the incoming transport.	Check source.
Invalid CAS mode	The CAS mode for fixed key should be AES_CBC for both descrambler and scrambler.	Change the CAS mode and reset the device.

Table 11-18: Alarm Raised by CAS

Alarm Message	Description	Solution
ECM Stream Error	This alarm is related to the ECMG machine. Cannot get ECM from ECMG.	1. Check ECMG logs. 2. Check AC. 3. Check the error number, reported from ECMG.
ECM Spooling Error	There is a failure in ECM spooling.	The total number of spooled tables should not exceed 128 tables per transport stream.
EMM PID Missing	The configured EMM is missing	■ Check EMM configuration ■ Check connectivity between device and EMMG.
EMM Bitrate Exceeded	The bitrate of the EMM is higher than the configured bitrate.	Check EMM configuration.
SCS ECMG Connection Error	The ECMG connection has been disconnected for 10 seconds. Services might not be encrypted properly.	Check the ECMG properties, the Ethernet network, and the ECMG.

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Table 11-18: Alarm Raised by CAS

Alarm Message	Description	Solution
SCS EIS Not Connected	The TCP connection with the EIS client on port 11000 is not established.	Ensure the following: ■ The TCP link with EIS (pint) exists. ■ The EIS configuration is 11000.
ECM is Missing in Configuration	One or more ECMs in one or more SCG messages are missing, or the device receives an SCG message with an unknown ECM ID.	Add an ECM and update as necessary to ensure that all ECMs in SCG messages are present in the ECM configuration.
PID Scramble is Missing in Configuration	One of the PIDs that is supposed to be scrambled isn't configured in the output.	Verify output configuration and EIS SCG provisioning.
SCS ECMG Communication Problem	The ECMG connection was disconnected for 10 seconds. Services might not be encrypted properly.	Check ECMG properties, the Ethernet network and the ECMG.
SCS CP Less than Delay Start	The Crypto Period is less than the delay start.	Adjust the Crypto Period or Delay Start property values to that the crypto period is greater than the delay start value.

Table 11-19: Alarm Raised by Reference Service

Alarm Message	Description	Solution
Remap Range Overflow	The number of PIDs of the Reference Service exceeds the configured number.	Increase the configured remap range.
Input Service Missing	The PMT of the Reference Service is missing.	Check source.
Input RSS PID Missing	At least one PID is missing in the Reference Service.	Check source.

Table 11-20: Alarm Raised by Output Stream

Alarm Message	Description	Solution
PID Missing	Provisioned PID is missing in the input.	Check source.
Unsupported Chroma Sampling Mode	The input video stream is not 4:2:0.	Do not attempt to re-encode video streams of chroma sampling mode other than 4:2:0.

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Table 11-20: Alarm Raised by Output Stream

Alarm Message	Description	Solution
Low Delay Video Stream Detected	The input video stream is low-delay and cannot be re-encoded.	Do not attempt to re-encode low-delay content.
HD Stream Detected	The video stream is HD and cannot be re-encoded.	Do not attempt to re-encode HD streams.
Unsupported Frame Rate	The input video stream is not NTSC.	Do not attempt to re-encode non-NTSC video.
Unsupported Resolution	The input video stream horizontal resolution is not supported.	Do not attempt to re-encode a video stream with a horizontal resolution that is not 480, 528, 544, 704, or 720.
Encrypted PID	The input stream is encrypted and cannot be re-encoded.	Do not attempt to re-encode encrypted content.
No DTS/PTS Detected at Input	No DTS/PTS was detected at input for 700 ms. The input video stream is not MPEG compliant.	Check the input stream.
Invalid DTS at Input	The input video stream is not MPEG compliant.	Check the input stream.
Sequence Header Error	The input video stream is not MPEG compliant.	Check the input stream.
Picture Header Error	The input video stream includes an invalid picture header or bad marker bits. The input video stream is not MPEG-compliant.	Check input stream.
Video Macro Block Level Error	A problem was encountered in decoding the slice and macro blocks.	Check the source.
MPEG1 Stream Detected	The video stream is MPEG1 and cannot be re-encoded.	Do not attempt to re-encode MPEG1 streams.
Progressive Refresh Stream Detected	A progressive refresh video stream was detected in a re-encoded service. Re-encoded services do not support progressive refresh streams.	Remove the progressive refresh stream from the re-encoded service.
Field Pictures Detected	Field pictures were detected. Field picture streams are not supported in re-encoded services.	Remove field picture stream from the re-encoded service.

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Table 11-20: Alarm Raised by Output Stream

Alarm Message	Description	Solution
Unexpected Frame Rate (Video Standard)	The input video stream is not MPEG compliant.	Check the input stream.
Unable to Decode Input Stream	The device cannot decode the input stream.	Check the input stream.
Corrupt Input TS	The input transport stream is corrupted.	Check the input stream.
Processing Input PID Missing	Internal error in transcoding engine.	Call Customer Support.
Wrong Video Standard (MPEG2/ H264)	This input video format is not supported in this version.	Check input.
Input Vertical Resolution Mismatch	The configured VR does not match the actual VR.	Check input.
Vertical Resolution Changed on Input	A notification as it is service affecting. While transcoding the input VR type changed.	Engine is resetting and transcodes with new resolution.
Invalid Picture Type (not I, P or B)	Applies to input video format H264. It is a failure related to decoding the stream.	Check input.
Reference PCR PID Interval Error	Did not get reference PCR for > 500 ms. Either the PID does not contain PCR values or it is missing.	Check source.
PID Recoding Failure	Invalid content for re-encoding.	Check source.
PID Xcoding Failure	Invalid content for transcoding	Check source.
Input Codec Not Supported	The input video type is different than 2, x80 and x1B.	Change the input type (does not require removal and re-creating the stream).
Output Codec Not Supported	The output codec is not supported	Change the output.
SD Transcoding Not Supported	When trying to transcode an SD stream.	Check configuration.
Audio - Cannot decode - Corrupted input	Invalid content for decoding.	Check input source. If problem persists, call Customer Support.

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Table 11-20: Alarm Raised by Output Stream

Alarm Message	Description	Solution
Audio - Decoder Failure	The device cannot decode the input stream due to either input source or stream configuration.	Check input source and stream configuration. If problem persists, call Customer Support.
Audio - Encrypted PID detected	Cannot decode an encrypted PID.	Check input source.
Audio - No input/ Unable to sync	No input stream is detected	Check input source.
Audio - No PES detected	No audio frames are detected in the input stream.	Check input source.
Audio - Input Audio Mode Higher than Config	Inconsistency between actual input audio mode and configured audio mode. For example, actual is MC and configured is ST.	Check Input Coding Mode configuration.
Decoding Format Mismatch Config.	The input decoding format is set to a low MHz decoder (AAC LC / AC3) but actually decoding format is a high MHz (AAC HE / E-AC3)	In the **Audio Transcoding** tab, define decoding format as **Any**.
Audio - Encoder Failure	The device cannot encode the input stream due to either input source or stream configuration.	Internal problem. If problem persists, call Customer Support.
Audio - Unsupported Output Bitrate	The configured output bitrate is not supported for the configured coding mode.	Check that bitrate configuration is supported for configured Output Coding Mode.
Audio - Unsupported Output Coding Mode	The configured output coding mode is not supported.	Check configuration. Try changing *Follow* to another value.
Audio - Unsupported Output Sample Rate	Output sample rate is always as in the input.	Check configuration.
Audio - Cannot Meet PCR Insertion Rate	PCR insertion rate is too low.	Increase the audio ES bitrate.
Audio - Encoder detect PTS Gap	No PTS was detected at input for XXX ms. The input video stream is not MPEG compliant.	Check input source.

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Table 11-21: Alarm Raised by Output Service

Alarm Message	Description	Solution
Backup Service 1 is Activated	Backup serivce1 is activated.	Information alarm only. Look for another alarm that triggered the backup service.
Backup Service 2 is Activated	Backup service 2 is activated.	Information alarm only. Look for another alarm that triggered the backup service.
Backup Service 3 is Activated	Backup service is 3 activated.	Information alarm only. Look for another alarm that triggered the backup service.
Service Failure	Service is not streamed out.	Check source.
Recoding Unit Failure	The recoding unit crashed resulting from an unknown error, or the input video stream is not MPEG compliant.	Check the input stream.
Input PCR Interval Error	Interval error > 100 ms.	Information only.
Corrupt Input PCR	The device detects more than one time base discontinuity within one second.	
PCR on Unsupported Component	The input PCR is not carried on the video component.	Information alarm.
Too Many ES	The input service includes a number of non-video elementary streams beyond the device's re-encoding capabilities. The maximum number of ES on the ProStream 1000 is 6.	Do not attempt to re-encode content with more than one video and five non video elementary streams.
Could not Allocate Recoding Unit	The device could not allocate a re-encoder to re-encode this service. There were no free units to re-encode the program.	Check how many re-encoded services (VBR, Caped VBR, and DTMX pools) were configured and remove unnecessary services.
Excessive Non-Video Rate	The allocated video rate is less than 2 Mbps.	Monitor the service to check its behavior. If problem persists, call Customer Support.
I-Frame Dropped	Due to errors in the input, the capped GOP structure was violated, and an I-frame was dropped.	Check the input stream.

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Table 11-21: Alarm Raised by Output Service

Alarm Message	Description	Solution
ReEncoded Service Required Video ES	There is no video ES for the re-encoded service.	Verify that a video PID is provisioned on the service.
ReEncoded Service Rate Too Low	In DiviTrackMX, the rate is too low for encoding.	N/A
EAS is Activated	EAS service is activated.	None.
EAS Input Service Missing	The associated EAS input service is missing.	Check the EAS input transport to ensure that the associated EAS input service exists.
Pass-Through Service Exceeded Max Rate	Input bitrate of the Pass-Through Service is higher than Max Bitrate. Service output is muted.	Check input signal.
Slate Service is Activated	Occurs when the Slate feature is activated.	None.
Slate Service Failure	Occurs on the service output when the Slate is missing from the service input (even when the Slate is not activated).	The stream cannot flow end-to-end. Check input stream.
Primary Service Failure	The primary/backup source failed.	The stream cannot flow end-to-end. Check input stream.
Backup Service 1 Failure	The stream cannot flow end-to-end.	Check input stream.
Backup Service 2 Failure	The stream cannot flow end-to-end.	Check input stream.
Backup Service 3 Failure	The stream cannot flow end-to-end.	Check input stream.
Service Name SCTE30 Error	In splicing, another spliceable service with the same name is detected.	Check configuration
Exceeded Spliceable ESs Capacity	In splicing, too many PIDs are associated with the service. The maximum PIDs are: Up to one video, up to two audio, up to eight data PIDs.	Check configuration to match spec.
No SCTE30 connection	In splicing, Ad-Server either did not send Init request or Init request is wrong.	Check Ad-Server configuration
Insertion Channel is Missing	Insertion channel (ad) did not arrive on time.	Check Ad-Server streaming interface.

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Table 11-21: Alarm Raised by Output Service

Alarm Message	Description	Solution
Input PMT Missing	PMT entry required on the output was not received on the input.	Recheck the extraction settings on the service provided as the tables' input for the PSIP/DVB regeneration.
Input VCT Missing	VCT entry required on the output was not received on the input.	Recheck the extraction settings on the service provided as the tables' input for the PSIP regeneration.
ReEncoded Service Missed Rate	DiviTrackMX, internal fault	If alarm persists, call Customer Support
Transcoding Unit Failure	The transcoding unit crashed resulting from an unknown error, or the input video stream is not MPEG compliant.	Check the input stream.
Could not Allocate Transcoding Unit	Too many services to transcode. Cannot allocate trans engine.	Check configuration.
Reenc and Trans are selected for the Service	Wrong configuration.	Check configuration either to re-encode or to trans
Service CBR Bitrate Too Low	The bitrate allocated for the video stream is too low.	Check bitrate allocated for the video stream.
Service CBR Overflow	The overall bitrate of non-video streams exceeds the configured service bitrate.	Check service bitrate.

Table 11-22: Alarm Raised by Pool

Alarm Message	Description	Solution
License Pool Missing	No license for pool and grace period has expired.	Purchase the required license

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Chapter 12
Additional Tools

Overview

The Tools Web client page includes additional features. These features are grouped as follows:

- IGMP - for selecting the required IGMP version. See *Selecting IGMP Version*.
- NTP and Time - for setting the time of the device. See *Setting Device Time*.
- Password - for defining an access level. See *Setting a Password*.
- HW Clock Source - for setting the hardware clock source. See *Defining HW Clock Source*.
- DPI - for splicing related configuration. See *Configuring DPI (Splicing)*.
- A/V Processing - for setting the following:
  - Video Format - for setting the video format. See *Defining the Video Format*.
  - Set-Top Box - for defining the set-top box mode. See *Configuring Set-Top Box Mode*.
  - ACE Video Configuration - for enabling PIP and setting the video frequency. See *Defining ACE Video Configuration*.
  - ACE Audio Configuration - for defining silence insertion. See *Defining ACE Audio Configuration*.
- EAS - for configuring Emergency Alert System. See *Configuring EAS Parameters*.
- EDU - see *Viewing EDU Parameters*.
- SNMP - see *Defining SNMP Parameters*.
- BDS
- VIS - see *Video Inventory System (VIS)*.
- Licenses - see *Licenses*.
- Redundancy - see *Device Redundancy*.

Selecting IGMP Version

IGMP-v3 enables you to reuse multicast addresses in a network. Multicast streams in an IGMP-v3 enabled network are identified not only by their destination address, but also by their source address.

ProStream 1000 may operate either in IGMP-v2 or IGMP-v3 mode. Switching between modes is service affecting.

To select IGMP Version:

1. In the Web page, select **Tools** > **IGMP** tab.

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2. Open the list and select the required mode:
   - Auto Detect
   - IGMP Version 2
   - IGMP Version 3

Setting Device Time

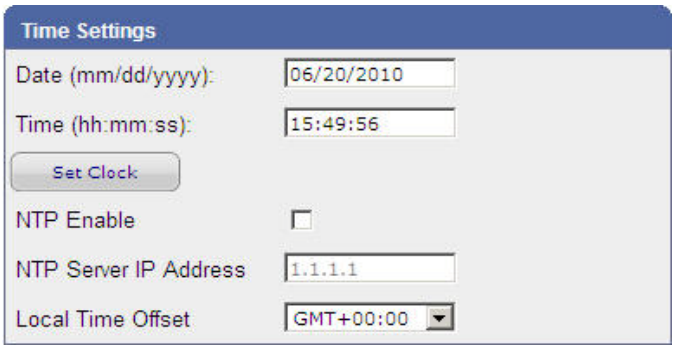
Network Time Protocol (NTP)

The Network Time Protocol table allows to synchronize the device time with the Universal Time Coordination (UTC) by connecting the device to an NTP server. If you enable this option, you cannot set the time of the unit manually.

To set ProStream time according to the NTP server:

Once you set the time according to the NTP server, you cannot set ProStream time manually.

1. In the Web page, select **Tools** > **Time** tab.



2. To synchronize the ProStream time with the UTC time, check the **NTP Enable** box.

   The Date and Time fields are disabled.
3. In **NTP Server IP Address**, enter the IP address of the NTP server.

   If an NTP server is unavailable, you may set the unit time manually.

Setting Device Time Manually

To set the device time manually:

1. In the **Date** and **Time** fields, enter date and time respectively. Date format: mm/dd/yyyy. Day format: hh:mm:ss.
2. To send required date and time to the unit, click **Set Clock**.

   A verification message appears.
3. Click **OK**.

   The required time is sent to the unit and the date and time are updated immediately.
4. To set the local time offset according to the Greenwich Mean Time (GMT), open the **Local Time Offset** list and select the required GMT offset.

NOTE: Set manually local time offset upon Day Light Saving changes.

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Setting a Password

- Select **Tools** > **Password** tab. See *Changing a Password*.

Defining HW Clock Source

In SFN application, the Receiver accepts an external clock

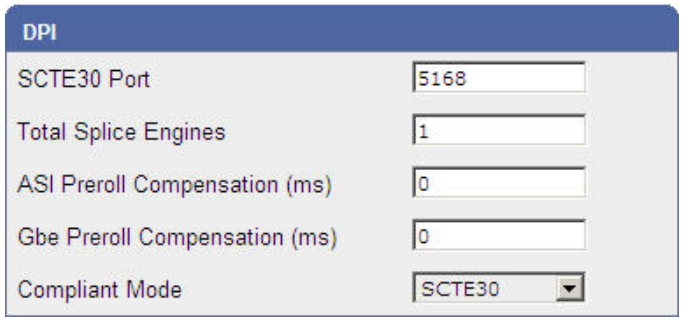
Slot 1- slot 5 - Select the requires slot for receiving the external clock.

Configuring DPI (Splicing)

Digital Programming Insertion (DPI) or Splicing is the process by which the main feed is spliced to allow the insertion of another stream, usually an ad. The transition from the main feed to the inserted stream and vise versa should be seamless, frame-accurate splice, to allow a flawless broadcast.

To define DPI parameters:

1. Select **Tools** > **DPI** tab.



2. In **STCE30 Port**, enter the port number via which the Ad server manages the splicer.
3. In **Total Splice Engines**, enter the number of splice engines.
4. In **ASI Preroll Compensation (ms)**, enter the required compensation of the ASI insertion channel.
5. In **GbE Preroll Compensation (ms)**, enter the required compensation of the GbE insertion channel.
6. Open the **Compliant Mode** and select either of the following:
   - SCTE30
   - C-COR

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Configuring A/V Processing

Defining the Video Format

When re-encoding, define the video format. Changes to the video format are applied only after rebooting the device.

1. In the Web page, select **Tools > A/V Processing** and focus on the **Video Format** section:

2. Under **Desired Video Format**, select the required option: PAL or NTSC.

   The video format changes only after rebooting. Apply the change and wait 10 seconds before rebooting.

Configuring Set-Top Box Mode

1. Select **Tools > A/V Processing** and focus on the **Set-Top-Box** section:.

2. Open the **Mode** list and select one of the following:
   - DVB
   - Motorola
   - Philips
   - Samsung SMT (gives an 8:9 aspect ratio for video headers of transcoded H.264 720x480i output)

Defining ACE Video Configuration

1. Select **Tools** > **A/V Processing** tab and focus on the **ACE Video** section.

2. Open the **PIP Enable** list and select either of the following:
   - Disable, default option.
   - Enable.
3. To set the video frequency, open the Video Frequency list and select 50Hz or 60Hz.

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Defining ACE Audio Configuration

1. Select **Tools** > **A/V Processing** tab and focus on the **ACE Video** section.

2. Open the **Silence Insertion Enable** list and select either of the following:
   - Enable - Full support of Silence Mode. If enabled, silence is inserted in cases of corrupt/ missing audio input.
   - Disable.
3. In **Silence Insertion Timeout (msec)**, enter the required time out.

   The default is 200 milliseconds. It indicates the period of time after input loss required before silence insertion occurs.

Configuring EAS Parameters

To configure the Emergency Alert System:

1. Select **Tools** > **EAS**.

2. Open the **EAS Mode** list and select one of the following:
   - None - No EAS application
   - GPI Converter - ProStream 1000 serves as the GPI converter that generates EAS request.
   - EAS Receiver - ProStream 1000 serves as the EAS receiver. Once you select EAS Receiver, additional fields appear for configuring the EAS receiver and the input EAS channel.

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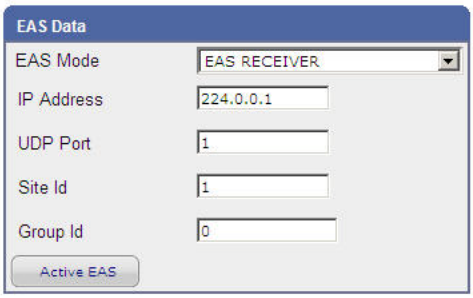
Configuring EAS Receiver

If **EAS Receiver** is selected, the following fields appear in the EAS tab:



To configure the EAS Receiver:

1. In **IP Address**, enter the EAS receiver IP address.
2. In **UDP Port**, enter the UDP port to receive the EAS.
3. In **Site ID**, enter the site ID of the EAS receiver.
4. In **Group ID**, enter the group ID of the EAS receiver.
5. Click **Active AES**, to activate ProStream 1000 as an AES receiver.
6. To add an EAS channel, click **Add EAS Channel**.
7. Open the **TS Stream Input** and select the required TS.

   This list is populated with TSs with EAS services.
8. In **Service ID**, enter the required service ID, that is an EAS service.
9. In **Name**, enter the required service name for this EAS service.

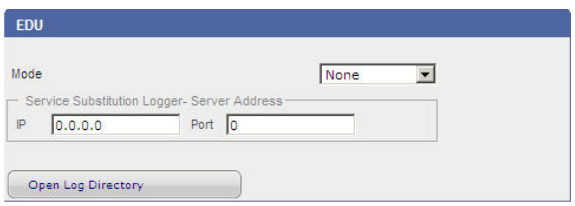
NOTE: See also *Setting EAS Parameters*.

Viewing EDU Parameters

The EDU is managed by the DMS who sends the EDUs a configuration file over the control channel. Use the EDU tab for viewing EDU configuration parameters as explained below.

To view EDU parameters:

1. Select **Tools** > **EDU** tab:.



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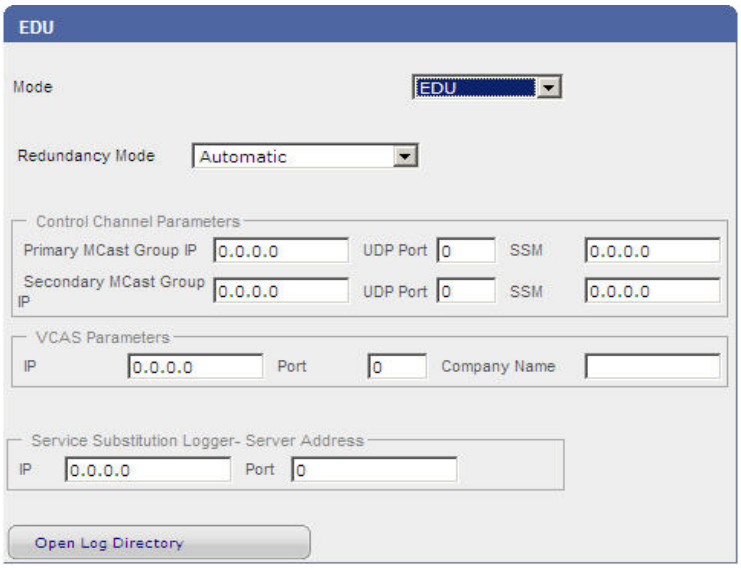
2. Open the Mode list and select **EDU**.

   The following dialog box appears:



3. In **Redundancy** mode, select the redundancy mode required for EDU redundancy:
   - None - No redundancy will occur
   - Manual - Revert to primary occurs manually
   - Automatic - Revert to primary is automatic
   - Manual Revert - Revert to primary occurs manually
4. In **Control Channel Parameters**, view the following:
   - Primary MCast Group IP - the multicast IP address of the primary control channel.
   - UDP - the number of the main port of the control channel. The default is 2000
   - SSN - the physical IP address of the video output port of the source device that sends the multicast stream. That is, the video output port of the DMS.
   - Secondary MCast Group IP - the multicast IP address of the secondary control channel.
   - UDP - the number of the secondary port of the control channel. The default is 2000
   - SSN - the IP address of the source device that sends the secondary multicast stream. That is the video output port of the DMS.
5. In **VCAS Parameters**, view/select the following:
   - IP - view/enter the IP address of the VCAS 9Verimatrix CAS) to allow connection between VM (Verimatrix) client of the EDU to the VCAS. Default IP address - 0.0.0.0.
   - VCAS Port - enter the required port number. This is the port over which the VCAS communicates with the VM (Verimatrix) client in the EDU units. By default, the port is 12697.
   - Company Name - enter the company name. This parameter is used by the VM client in the EDU for entitlement. By default, this field is blank.
6. To allow a BlackOut (BO) log server to listen to BO messages sent from the EDU, enter the following parameters in **Service Substitution Logger – Server Address**:
   - IP - view/enter the IP address of the BlackOut server.
   - Port - view/enter the port number over which the server listens to BO messages sent by the EDU.

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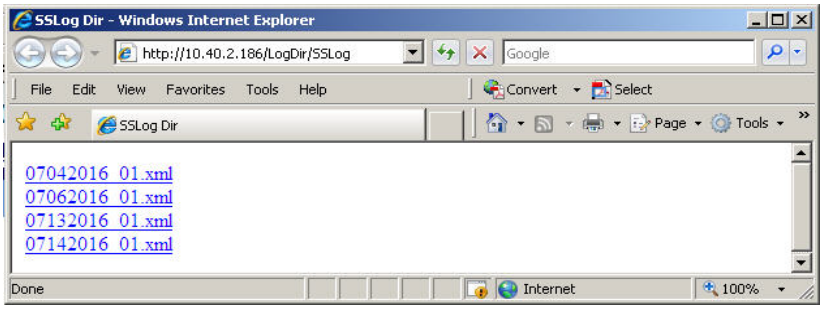
- To view a BO report generated by the BO log server, use any network analyzer application such as WireShark. Click **Open Log Directory**, the following page appears. Click the required link to view a report:



Defining SNMP Parameters

The EDU is capable of reporting its status via SNMP (Simple Network Management Protocol) to a third-party SNMP-based network management systems.

The EDU status is reported to the SNMP manager as SNMP Traps - notifications that the EDU device initiates and sends to the SNMP manager to indicate the assertion or remittance of an alarm or warning. SNMP Traps are sent only to SNMP managers that are registered with the EDU. Up to four SNMP managers can be configured.

To forward SNMP traps:

1. Select **Tools** > **SNMP** tab.

2. In IP 1 - IP 4, enter the IP address of the computer to which all SNMP traps from the EDU will be forwarded.

Video Inventory System (VIS)

As services traverse the network, multicast addresses change due to local service aggregation and ad splicing. Since the operator cannot correlate a multicast address to a particular service, it becomes difficult to address quality issues and resolve outages in a timely fashion resulting in longer down times, higher call volume, and a less than optimal customer experience.

The VIS feature enables you to create a video inventory system by appending information to the Service Description Table (SDT). The SDT is populated at the multiplex source within the Comcast network, and updated by each device that manipulates the MPEG transport stream with a device identification. Thus, you can easily determine the path for any given service.

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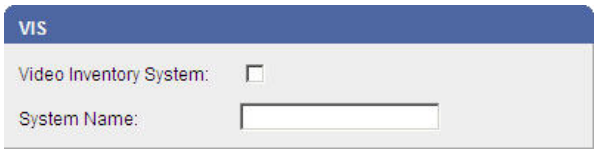
To use the VIS feature:

1. Select **Tools** > **VIS** tab:



2. Select **Video Inventory System** to enable the VIS feature.
3. In **System Name** enter the required name to append to the SDT table.

Licenses

The following features of ProStream 1000 version 6.0 and up require licensing:

- Video and audio transcoding - each transcoded stream requires a license
- VBR pools - ACE DiviTrackMX™

To transcode, you need to purchase a license. For the complete list of available licenses, see *Table 12–3 on page 183*.

Licenses are arranged in hierarchy according to their capabilities. You can use a license with a high hierarchy for operations that require a lower hierarchy, as the following examples show:

- If you purchased a HD transcoding license, you can use it for SD transcoding.
- If you purchased a H.264 transcoding license, you can use it for MPEG-2 transcoding.

To view license hierarchies, see *Licenses Hierarchy*.

ProStream 1000 is shipped with the purchased licenses. If you need an additional license, ProStream 1000 grants you a grace period of 45 days of device uptime as well. When the grace period is active, the alarm *License Grace Period Enabled* is raised. Once licenses are installed, the grace period is reset.

The following table lists the licensing specifications

Table 12–1: Licensing Specifications

Parameter	Explanation
Licensed feature	■ Video and audio transcoding (ACE only) - per each stream ■ VBR pools - ACE DiviTrackMX™
License Type	■ Permanent - Once you install a license, it is for unlimited time ■ Grace - All features are working for 45 days grace period. Grace period of 45 days is counted according to device uptime. ■ Expired - Licenses that are based on a calendar timeline. These licenses are for demo purposes only.

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Table 12–1: Licensing Specifications

Parameter	Explanation
License Management	Licenses are added/removed via the following: ■ External license tool (NLM) - this tool resided on another PC. The device uses HTTP to transfer files from/to NLM. See *Licensing System Architecture*. *Note*: Adding/removing licenses does not affect running streams. However, it affects licensing allocation. See *License Allocation*. *Note*: In case of card failure, to release licenses you should manually disable transcoding.
Firmware Upgrade/ Downgrade	Licenses are maintained after upgrade/downgrade.
License Allocation	Licenses are allocated according to their hierarchy. See *License Allocation*.

Licensing System Architecture

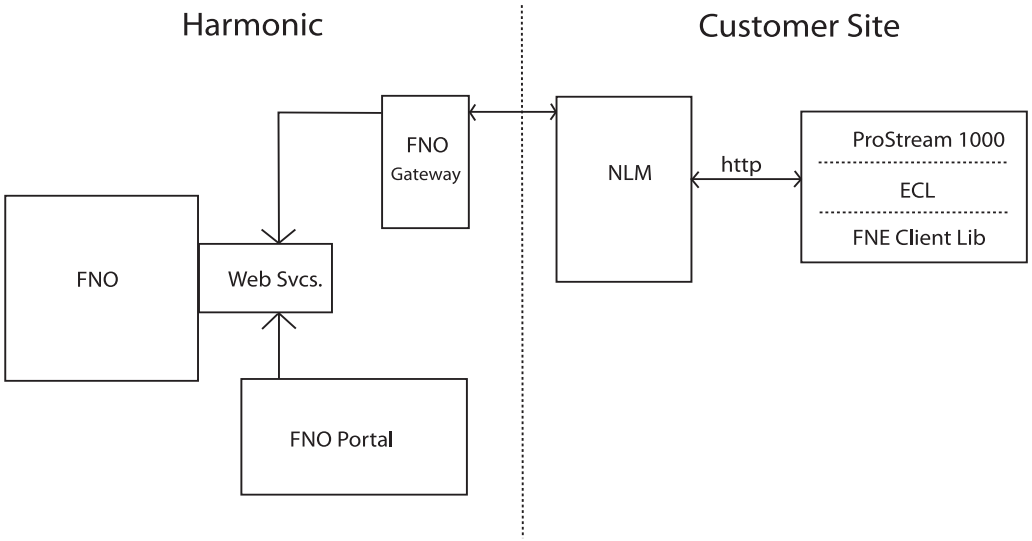

Table 12–2: Licensing System Architecture Legend

Term	Explanation
NLM	Nodelock License Manager. A desktop application
FNO	Flexera database that stores licenses at the Harmonic backoffice

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Supported Licenses

The following table lists the currently supported licenses.

NOTE: In the Duration column, **P** stands for permanent.

Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-ALL	p	Firmware License for Transcoding FIRMWARE LICENSE FOR ALL ProStream 1000 FUNCTIONS	
FW-PRM-1K-ACE-ANY-FORMAT-DEMO	180 days	Firmware License for DEMO enables output of HD, SD, MPEG-2, H.264, audio Transcoding	
FW-PRM-1K-ACE-ANY-FORMAT-LAB	p	Firmware License for LAB enables output of HD, SD, MPEG-2, H.264, audio Transcoding	
FW-PRM-1K-ACE-ANY-FORMAT-OUT	P	Firmware License for ANY output format: HD, SD, MPEG-2, H.264 Transcoding	
FW-PRM-1K-ACE-BACKUP		Firmware License for Transcoding FIRMWARE LICENSE FOR ALL ProStream 1000 FUNCTIONS for BACKUP	
FW-PRM-1K-ACE-SPARE	30 days	Firmware License for ACE COLD SPARE HD, SD, MPEG-2, H.264 output Transcoding	
FW-PRM-1K-ACE-ANY-OUT-SD	P	Firmware License for SD MPEG-2, H.264 output Transcoding	
FW-PRM-1K-ACE-PIP-AVC-OUT	P	Firmware License for H.264 PIP output Transcoding	

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-AVC-OUT-HD	P	Firmware License for HD, H.264 output Transcoding	FW-PRM-1K-ACE-AVC-OUT-HD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT
FW-PRM-1K-ACE-AVC-OUT-SD	P	Firmware License for SD, H.264 output Transcoding	FW-PRM-1K-ACE-AVC-OUT-SD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-ANY-OUT-SD -> FW-PRM-1K-ACE-AVC-OUT-HD -> FW-PRM-1K-ACE-DWCV-AVC-OUT-SD
FW-PRM-1K-ACE-MP2-OUT-HD	P	Firmware License for HD, MPEG-2 output transcoding	FW-PRM-1K-ACE-MP2-OUT-HD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AVC-OUT-HD

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-MP2-OUT-SD	P	Firmware License for SD, MPEG-2 output transcoding	FW-PRM-1K-ACE-MP2-OUT-SD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-ANY-OUT-SD -> FW-PRM-1K-ACE-MP2-OUT-HD -> FW-PRM-1K-ACE-AVC-OUT-SD -> FW-PRM-1K-ACE-AVC-OUT-HD -> FW-PRM-1K-ACE-DWCV-MP2-OUT-SD -> FW-PRM-1K-ACE-DWCV-AVC-OUT-SD
FW-PRM-1K-ACE-DWCV-AVC-OUT-SD	P	Firmware License for DownConvert to SD, H.264 output Transcoding	FW-PRM-1K-ACE-DWCV-AVC-OUT-SD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL-> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AVC-OUT-HD

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-DWCV-MP2-OUT-SD	P	Firmware License for DownConvert to SD, MPEG-2 output Transcoding	FW-PRM-1K-ACE-DWCV-MP2-OUT-SD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL-> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-DWCV-AVC-OUT-SD -> FW-PRM-1K-ACE-MP2-OUT-HD
FW-PRM-1K-ACE-HD-AVC-PIP-OUT	P	Firmware License for HD H.264 PIP output Transcoding	FW-PRM-1K-ACE-HD-AVC-PIP-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-PIP-AVC-OUT -> FW-PRM-1K-ACE-SD-AVC-PIP-OUT -> FW-PRM-1K-ACE-ANY-FORMAT-OUT-> FW-PRM-1K-ACE-AVC-OUT-SD -> FW-PRM-1K-ACE-AVC-OUT-HD

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-SD-AVC-PIP-OUT	P	Firmware License for SD H.264 PIP output Transcoding	FW-PRM-1K-ACE-SD-AVC-PIP-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-PIP-AVC-OUT -> FW-PRM-1K-ACE-HD-AVC-PIP-OUT -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AVC-OUT-SD -> FW-PRM-1K-ACE-AVC-OUT-HD
FW-PRM-1K-ACE-AUD-ST-OUT	P	Firmware License for Audio Transcoding of Stereo output Transcoding	FW-PRM-1K-ACE-AUD-ST-OUT-> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-DD-ST-OUT -> FW-PRM-1K-ACE-AUD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-AUD-MC-OUT		Firmware License for Audio Transcoding of Multichannel output Transcoding	FW-PRM-1K-ACE-AUD-MC-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT
FW-PRM-1K-ACE-AUD-DD-MC-OUT		Firmware License for Audio Transcoding of Dolby Digital Multichannel output Transcoding	FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-AUD-DD-ST-OUT	P	Firmware License for Audio Transcoding of Stereo Dolby Digital output Transcoding	FW-PRM-1K-ACE-AUD-DD-ST-OUT-> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT
FW-PRM-1K-ACE-AUD-DD+-MC-OUT	P	Firmware License for Audio Transcoding of Dolby Digital+ Multichannel output Transcoding	FW-PRM-1K-ACE-AUD-DD+-MC-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL-> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT
FW-PRM-1K-ACE-AUD-DD+-ST-OUT	P	Firmware License for Audio Transcoding of Dolby Digital+ Stereo output Transcoding	FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL-> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-AUD-DWMIX-OUT	P	Firmware License for Audio Transcoding of Multichannel IN, Stereo OUT output Transcoding	FW-PRM-1K-ACE-AUD-DWMIX-OUT-> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-DWMIX-DD-OUT -> FW-PRM-1K-ACE-AUD-MC-OUT-> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT
FW-PRM-1K-ACE-AUD-DWMIX-DD-OUT	P	Firmware License for Audio Transcoding of Multichannel IN, Stereo Dolby Digital output Transcoding	FW-PRM-1K-ACE-AUD-DWMIX-DD-OUT-> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-AUDLVL-MC	P	Firmware License for Multichannel 5.1 Audio Leveling	FW-PRM-1K-ACE-AUDLVL-MC-> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT
FW-PRM-1K-ACE-AUDLVL-ST	P	Firmware License for Stereo 2.1 Audio Leveling	FW-PRM-1K-ACE-AUDLVL-ST -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUDLVL-MC

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-MW-AUD-AAC-OUT	P	Firmware License for Mobile/Web audio xcoding of AAC stereo out	FW-PRM-1K-ACE-MW-AUD-AAC-OUT -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-AUD-ST-OUT -> FW-PRM-1K-ACE-AUD-DD-ST-OUT -> FW-PRM-1K-ACE-AUD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD-MC-OUT -> FW-PRM-1K-ACE-AUD-DD+-ST-OUT -> FW-PRM-1K-ACE-AUD-DD+-MC-OUT
FW-PRM-1K-ACE-MW-MBR-OUT-HD	P	Mobile/Web AVC MBR-group of 2 HD or 1HD + 0 to 3 SD profiles Firmware License	FW-PRM-1K-ACE-MW-MBR-OUT-HD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE-MW-MBR-OUT-SD	P	Mobile/Web AVC MBR-group of up to 4 SD profiles Firmware License	FW-PRM-1K-ACE-MW-MBR-OUT-SD -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT -> FW-PRM-1K-ACE-MW-MBR-OUT-HD
FW-PRM-1K-DTMX-1	P	DTMX FW License	FW-PRM-1K-DTMX-1 -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE
FW-PRM-1K-DEVICE-REDUNDANCY		ProStream 1000 Device Redundancy Firmware License	FW-PRM-1K-DEVICE-REDUNDANCY -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE
FW-PRM-1K-SUPPORT	P	Firmware License for ALL ProStream 1K ACE Functions for 45 days support usage.	
FW-PRM-1K-ACE-MW-LOGO	P	Firmware license for MBTS group	
FW-PRM-1K-ACE-DPI-COND	P	Stream Conditioning Support License. One Per Video Stream Required.	
FW-PRM-1K-ACE-MW-MBR-OUT	P	Firmware for video transcoding for Multiscreen. AVC multi-bitrate group of profiles.	

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Table 12–3: Supported Licenses

License Name	Duration	Description	
FW-PRM-1K-ACE--LOGO	P	Firmware license for ACE Logo insertion for broadcast. 1 license per service.	
FW-PRM-1K-ACE-AUDLVL-NCC	P	Firmware option for ProStream 1000 ACE platform, enabling automatic audio levelling of one (1) embedded audio channel following NCC standard. The purchase of this option, when and if available, is separate and independent from the purchase of all equipment and/or services contained within this quotation. Requires ACE Internal Video Processing card.	FW-PRM-1K-ACE-AUDLVL-NCC -> FW-PRM-1K-SUPPORT -> FW-PRM-1K-ACE-ANY-FORMAT-LAB -> FW-PRM-1K-ACE-ANY-FORMAT-DEMO -> FW-PRM-1K-ACE-ALL -> FW-PRM-1K-ACE-BACKUP -> FW-PRM-1K-ACE-1K-SPARE -> FW-PRM-1K-ACE-ANY-FORMAT-OUT

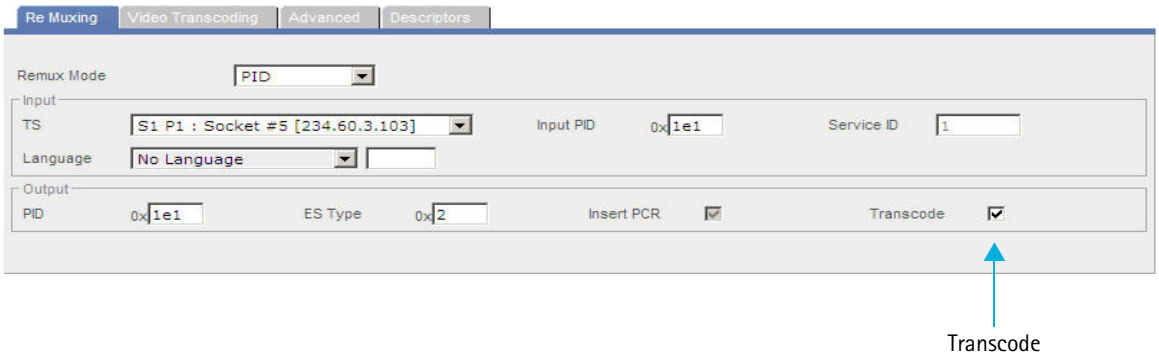
Working with Licenses

To transcode and to work with VBR pools, you need to purchase licenses.

To mange your licenses, that is to install and to remove licenses, use the NLM (Nodelock License Manager), an external tool. See *Licensing System Architecture*.

Once you select **Transcoding** per audio/video PID (Re Muxing tab) and click **Apply**, the device activates the license according to the output transcoding format.

NOTE: If you did not configure video or audio transcoding, yet selected **Transcoding**, once you click **Apply**, the default license is activated.



Licenses Hierarchy

Below, you can find a list of the licenses. Each entry starts with the required license in bold. If this license does not exist, the unit looks for the next license in the hierarchy list. If none of the licenses in the list exist, the functionality runs under grace period.

The following licenses are platform level licenses - 1 license enables everything on the device:

- FW-PRM-1K-SUPPORT
- FW-PRM-1K-ACE-ANY-FORMAT-DEMO
- FW-PRM-1K-ACE-ANY-FORMAT-LAB
- FW-PRM-1K-ACE-ALL
- FW-PRM-1K-ACE-BACKUP
- FW-PRM-1K-ACE-1K-SPARE

Currently Support, ALL and BACKUP are not in implemented.

The following licenses are per service but can replace several others in the hierarchy.

FW-PRM-1K-ACE-ANY-FORMAT-OUT - can replace any video codec output including Mobile/Web and any audio codec transcoding.

FW-PRM-1K-ACE-ANY-OUT-SD- can replace any SD video codec output.

License Hierarchy – Example 1

If you purchased license: FW-PRM-1K-ACE-MP2-OUT-HD and you need to output an MPEG-2 SD stream.

Due to license hierarchy (see *Table 12–4* and following picture), you can use the FW-PRM-1K-ACE-MP2-OUT-HD license to output an MPEG-2 SD stream.

License Hierarchy – Example 2

If you purchased license: FW-PRM-1K-ACE-MP2-OUT-HD and you need to output an MPEG-2 SD stream.

Due to license hierarchy (see *Table 12–4*), you can use the FW-PRM-1K-ACE-MP2-OUT-HD license to output an MPEG-2 SD stream. However, if you also need to transcode to HD MPEG-2 output, your purchased license is already occupied by the MPEG-2 SD stream. In this case, you can transcode to HD MPEG-2 output with a Grace type license. The device grants you with the FW-PRM-1K-ACE-MP2-OUT-HD license a grace period of 45 days. During this time, you can purchase another license and install it as explained in the following section *License Allocation*.

License Allocation

To use the FW-PRM-1K-ACE-MP2-OUT-HD, purchase the FW-PRM-1K-ACE-MP2-OUT-SD license. Once the latter is installed, licenses are re-allocated, and as a result FW-PRM-1K-ACE-MP2-OUT-HD is free for MPEFG-2 HD transcoding.

License Status

To work with license status:

1. Log into the device via the Web client.

   See *Logging into ProStream 1000*.

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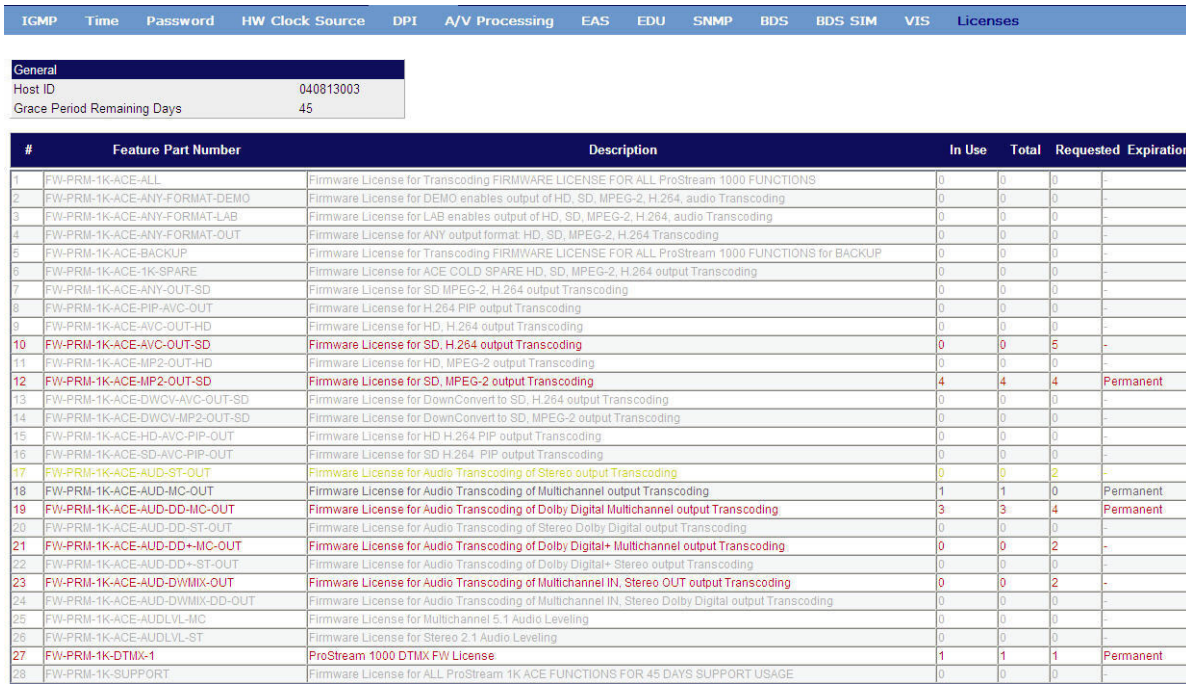
2. Select **Tools** > **Licenses**.



3. In **General**, view the following:
   - Host ID - Unique number of licenses host, usually chassis serial number.
   - Grace period - indicates the grace period in days. When the grace period is expired, **Grace Period Expired** appears in red.

4. In the table, view the following:
   - Feature Part Number - Part number of the license
   - Description - Short description of the license. See *Licenses*.
   - In use - Indicates the number of licenses per type that are currently being used
   - Total - Total number of licenses per type installed on the device
   - Requested - Number of licenses requested for current transcoding configuration
   - Expiration - Indicates the expiration date of the license. For none expired licenses, Permanent appears.

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Licenses might appear in the table in the following colors:

Table 12–4: Licenses and Colors

Color	Explanation
Grayed out	Licenses that are not installed or requested
Gray	Licenses that are properly installed
Red	Licenses in a grace period
Yellow	Licenses that are not installed and use other licenses according to licensing hierarchy

NOTE: In case of an internal licensing failure, a general failure message appears in the **Licenses** page.

Device Redundancy

Overview

In order to ensure the continuous transmission of video/data streams, transmitting networks employ various protection or redundancy options. Redundancy solutions are implemented where high availability is required. Redundancy solutions provide various levels of assurance (power supply versus device redundancy) and are application dependent.

This section discusses the redundancy solution in the stream processing realm that relates to device redundancy of devices that work in standalone mode. This solution eliminates the need for NMX management for achieving device redundancy. The redundancy mechanism is a 1:1 device redundancy and it protects from severe failures and provides a high level of assurance.

To allow redundancy, the system is organized as follows:

- Primary device - One of the ProStream devices is defined as the Primary device. This is the device that advertises the latest configuration.
- Backup device - One of the devices is defined as the Backup device. This is the device that gets the most updated configuration from the primary device. Usually the backup device polls the configuration of the primary device once redundancy is applied and during operation to monitor for changes in the primary configuration. Once the backup device gets the configuration it performs the following:
  - Updates the configuration and applies it - When updating the configuration, basic device parameters such as device IP address and the assignment of ports are not updated. You need to make sure that the configuration of the port assignment is identical for all devices in the same group ID. See Advanced Redundancy Configuration.
- Device Connectivity - Primary and backup devices are connected via management, or CAS or GbE ports.
  - The connection over any of the ports should be multicast.
  - On each device, in the same redundancy group, at least two of the ports eligible for redundancy, should be assigned.
  - On each device, in the same redundancy group, at least same two ports should be assigned for redundancy.

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- The connection is either directly or via a switch. The devices communicate via HHP (Harmonic Heartbeat Protocol). The devices send to each other heartbeat messages at an interval defined in milliseconds.

- Group ID (GID) - A network includes multiple Harmonic devices with the same ID. To differentiate between the devices, devices that are on the same redundancy system are associated to the same group. Currently, a redundancy system consists of two devices only, a primary device and its backup device.
- Redundancy Types:
  - Warm - Backup gets the configuration of the primary device and applies it but the backup is inactive, and does not broadcast
  - Hot - Backup gets the configuration of the primary device and applies it and backup is active, it broadcasts
- Redundancy Switch Types:
  - Manual - Upon a Device Redundancy Trigger (DRT), only a manual redundancy switch takes place. That is, you need to switch from primary to backup.
  - Automatic - Upon a Device Redundancy Trigger (DRT), an automatic redundancy switch takes place.

The following table lists the redundancy switch types and the state of the primary and backup devices

Table 12–5: Redundancy Types and Redundancy Switch

Redundancy Switch Type	Primary	Backup - Warm	Backup - Hot
Manual	Active	Inactive	Active
Automatic	Active/Inactive*	Active/Inactive*	N/A

* Pending device state - one device is always active and the other is inactive.

List of DRTs (Device Redundancy Triggers)

When the following alarms are raised a redundancy switch takes place:

- CPC HW Failure
- Card Missing
- Card Mismatch
- 8VSB Card HW Failure
- GbE Card HW Failure
- GbE 4G Card HW Failure
- ASI Input Signal Loss
- ASI Input Sync Loss

To see the list of alarms related to redundancy, see *Troubleshooting*, under Platform.

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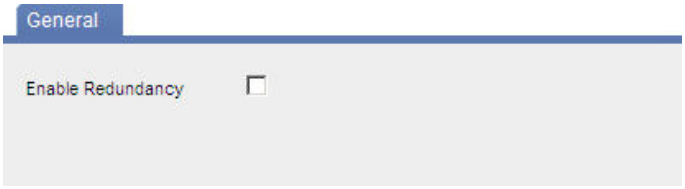
Configuring Device Redundancy

The following instructions refer to 1:1 device redundancy. You need to configure the redundancy parameters for both the primary and for the backup device. The instructions refer to both, unless otherwise indicated.

To configure device redundancy:

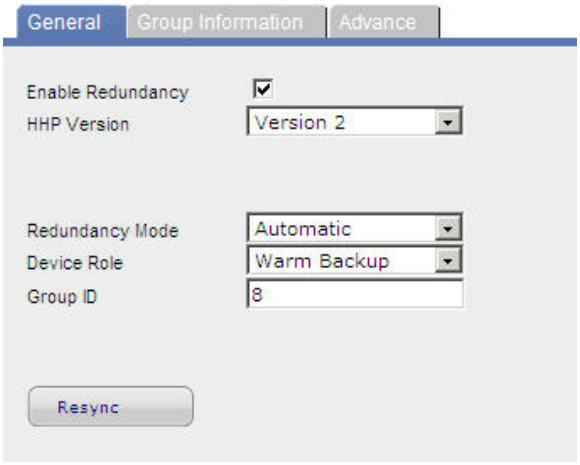
1. Select the **Tools** > **Redundancy** > **General** tab.



2. Select **Enable Redundancy**.

NOTE: If two devices are working in redundancy mode and you disable redundancy, the devices start broadcasting as standalone devices.

The tab is updated as the following picture shows:.



3. **HHP Version** - open the **HHP Version** list and select the required version:
   - Version 1 - Applies to NMX device redundancy only.
   - Version 2 - By default **Version 2** is selected.
4. **Redundancy Mode** - Open the **Redundancy Mode** list and select either of the following:
   - Automatic - Default option
   - Manual - Redundancy switch is done by the user.
5. **Device Role** - Open the **Device Role** list and select one of the following options:
   - Primary - This device advertises the latest configuration.

   The following options refer to the backup device:
   - Warm Backup - Backup gets the configuration of the primary device and applies it but the backup is in active, it does not broadcast.
   - Hot Backup - Backup gets the configuration of the primary device, applies it and broadcasts.

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6. **Group ID** - Enter the required Group ID number. Group ID should be the same for the primary and backup device.

NOTE: You should not move a device from a group when it is broadcasting and is connected to a network.

7. Click **Apply**.

   The redundant devices start communicate via the HHP protocol. The backup device obtains the configuration of the primary device and during operations monitors for changes in the configuration of the primary device.

Re-Synchronization Button

The Resync button allows to obtain the configuration of the primary. Typically, the backup device polls the primary configuration during operation to monitor for changes in the configuration. Use this button in case a problem arises.

Viewing Redundancy Group Information

To view redundancy group information:

1. Log into the device via the Web client. See *Logging into ProStream 1000*.
2. Select **Tools** > **Redundancy** > **Group Information** tab.

3. View the following for all devices of the group:

Table 12–6: Redundancy Group Information

Parameter	Explanation
#	Sequential number
Device Mode	Indicates whether Automatic or Manual.
Device Role	Indicates whether primary /warm backup/hot backup
Status	OK - device is up and running Fail - device is faulty
IP	The IP address of the device
Name	The name of the device
SGID	Sub Group ID. For future use
MAC	The MAC address of the device
Configuration Sync.	The exact time and date the last configuration synchronization between the primary and backup took place. For future use.
State	The actual state of the device: Active Inactive - Standby

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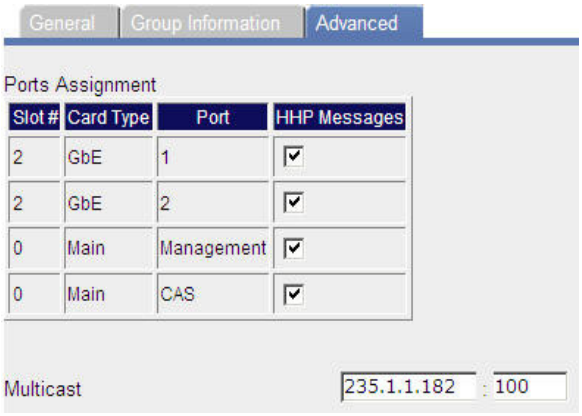
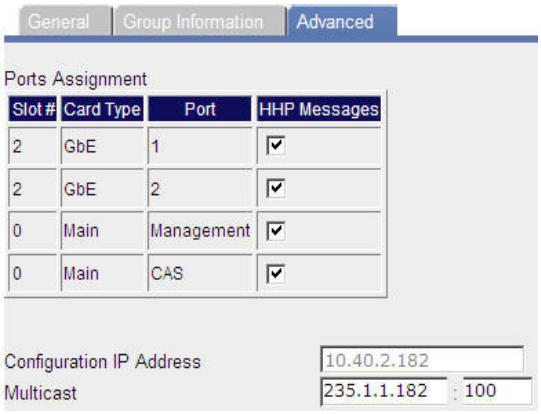
Advanced Redundancy Configuration

The **Advanced** tab enables you to view and configure GbE port parameters. It is only for advanced users.

1. Log into the device via the Web client. See *Logging into ProStream 1000*.
2. Select **Tools** > **Redundancy** > **Advanced** tab.



Backup device



Primary device

3. View and configure the GbE ports to carry the redundancy data

Table 12–7: GbE Ports Redundancy Information

Parameter	Explanation
Slot #	The slot number on which the GbE port is located.
Card Type	Indicates whether Main card, or GbE card.
Port	Indicates the following: ■ GbE - port number ■ Main - whether management or CAS
HHP Messages	If selected, the port communicates via an HHP protocol for redundancy purposes.

NOTE: Configure at least two ports to communicate via HHP.

4. **Configuration IP Address** - Appears for the Primary device only. View the primary device IP address.
5. In **Multicast**, enter the multicast address that serves the redundancy.

   The multicast must be identical for the primary and the backup device.

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Chapter 13
Support

Support Page

Diagnostic information about the ProStream device is available via the **Support and Troubleshooting** page.

To access Support:

1. In the ProStream Web client, select the **Support** tab.
2. Select the required command.
3. Enter the required parameters, if required.
4. Click **Execute**.
5. View the results in the **Result** section.

Command list

Table 13–1: Command List

Command	Explanation	Parameter
Clear configuration	Removes the current configuration with an option to remove also the current SW version.	
DiviTrack Information	Displays DToIP routes	
Get Versions	Displays SW and BOOT versions as well as IOM, CPC and MidPlane FPGA versions.	
Recorder Units Allocation	Displays the allocation of the recorder units and allows you to allocate a general or splicing recorder.	
XC Service Information	Displays the configured transcoded services	
Input PID Information	Displays detailed information on all PIDs in the input TS.	Slot number
View Alarms	Displays all current alarms.	
View CAS Information	Displays detailed information on CAS components	
View GbE Card Information	Displays detailed information on the card and its ports.	Slot number
View ASI or RC Card Information	Displays detailed information on the mux configuration and the actual routing.	Slot number
View ACE Card Information	Displays detailed information on the Ace configuration and actual routing.	Slot number

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Table 13–1: Command List

Command	Explanation	Parameter
View ARP table	Displays entries of the ARP table of the system.	
View Net Stat	Displays information on all network connections.	
View Routing Table	Displays the destinations and their parameters.	
View ETH Information	Displays detailed information on the Ethernet ports.	
View Extraction Counters	Allows to check the input feed status.	
View SCTE30 Log	Displays a log of SCTE30 messages	Location of recent lines
View Splice Manager Information	Displays splice Manager information	■ Channel name ■ Time ■ Duration ■ Reset Counters ■ Simulate Cue
Ping	Tests that a remote host is reachable	Destination IP
Save Configuration	Saves the current configuration to a file.	
Get Up Time	System get up time.	
Reset	Reboots the device.	
Configuration Log	Allows to record the configuration and to present the configuration log.	
Upload File	Displays the Upload file	
Ethereal	Displays the Ethereal manager	
TS Routes	Displays TS routes of all PIDs	
Client Log Messages	Displays all valid messages	
Reset on Device Exception	For debug purposes only. Allows to enable/ disable reboot in case of an unexpected exception, that is, fatal error.	Setting - Enabled/ disabled
Prepare Troubleshooting Bundle	Bundles a set of files required for troubleshooting for a later download.	
Download Troubleshooting Bundle	Downloads the prepared troubleshooting bundle.	Clear the IE cache before downloading

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Table 13–1: Command List

Command	Explanation	Parameter
Log Command Traffic	Allows to save/discard all the Support page traffic to/from a file. You can download the file into the troubleshooting bundle.	Disabled/Enabled
Clear Command Traffic Log	Clears the command traffic log (the traffic logging has to be disabled)	Logging should be disabled.
DSR Info	Displays detailed information on DSR configuration	

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Appendix A
Contacting the Technical Assistance Center

Harmonic Global Service and Support has many Technical Assistance Centers (TAC) located globally, but virtually co-located where our customers can obtain technical assistance or request on-site visits from the Regional Field Service Management team. The TAC operates a Follow-The-Sun support model to provide Global Technical Support anytime, anywhere, through a single case management and virtual telephone system. Depending on time of day, anywhere in the world, we will receive and address your calls or emails in one of our global support centers. The Follow-the-Sun model greatly benefits our customers by providing continuous problem resolution and escalation of issues around the clock.

Report an issue online at:

http://harmonicinc.com/webform/report-issue-online

Table A–1: Technical Support Phone Numbers and Email Addresses

Region	Telephone Technical Support	E-mail
Americas	888.673.4896 (888.MPEG.TWO) or +1.408.490.6477	*support@harmonicinc.com*
Europe, Middle East, and Africa	+44.1252.555.450	*emeasupport@harmonicinc.com*
India	+91.120.498.3199	*apacsupport@harmonicinc.com*
Russia	+7.495.926.4608	*rusupport@harmonicinc.com*
Mainland China	+86.10.6569.5580	*chinasupport@harmonicinc.com*
Japan	+81.3.5565.6737	*japansupport@harmonicinc.com*
Asia Pacific – Other Territories	+852.3184.0045 or 65.6542.0050	*apacsupport@harmonicinc.com*

The Harmonic Inc. support website is:

http://www.harmonicinc.com/content/technical-support

The Harmonic Inc. software download locations are:

All Harmonic software except Cable Edge software	*https://harmonic.force.com/SWAccess/SWDownloadLogin*
Cable Edge software	*ftp://ftp.harmonicinc.com*

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The Harmonic Inc. corporate address is:

Harmonic Inc.
4300 North First St.
San Jose, CA 95134, U.S.A.
Attn: Customer Support

The corporate telephone numbers for Harmonic Inc. are:

Tel. 1.800.788.1330 (inside the U.S.)
Tel. +1.408.542.2500 (outside the U.S.)
Fax.+1.408.542.2511

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Appendix B
Safety and Regulatory Compliance Information

Legal Disclaimer: Information in this document is provided in connection with Harmonic products. Unless otherwise agreed in writing Harmonic products are not designed nor intended for any application in which the failure of the product could cause personal injury or death.

NOTE: The information in this appendix may apply to purchased products only.

Important Safety Instructions

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, noting especially those instructions related to risk of fire, electric shock or injury to persons. You must adhere to the guidelines in this document to ensure and maintain compliance with existing product certifications and approvals. In this document, we use “product,” “equipment,” and “unit” interchangeably.

This equipment generates, uses, and can radiate radio frequency energy. It may cause harmful interference to radio communications if it is not installed and used in accordance with the instructions in this manual. Operation of this equipment in a residential area is likely to cause harmful interference If this occurs, the user will be required to correct the interference at his or her own expense.

In event of conflict between the information in this document and information provided with the product or on our website for a particular product, this product documentation takes precedence.

Safety Symbols & Translated Safety, Warning & Caution Instructions (English)

To avoid personal injury or property damage, before you begin installing or replacing the product, read, observe, and adhere to all the following safety instructions and information. Harmonic products and/or product packaging may be marked with the safety symbols used throughout this document, when it is necessary to alert operators, users, and service providers to pertinent safety instructions in the manuals.

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Mark	Notes
Warning	**Installing or Replacing the Product Unit Warning** ■ Only trained and qualified service personnel should be allowed to install, replace, or service this unit (refer AS/NZS 3260 Clause 1.2.14.3 Service Personnel). ■ Read the installation instructions before connecting the system to the power source. ■ When installing or replacing the unit, always make the ground connection first and disconnect it last. ■ Installation of the unit must comply with local and national electrical codes. ■ This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of special tool, lock and key or other means of security. ■ Use only specified replacement parts. ■ Do not use this unit in or near water. Disconnect all AC power before installing any options or servicing the unit unless instructed to do so by this manual.
Warning	**Rack Mount Warning** ■ To prevent bodily injury when mounting or servicing this unit in a rack, special precautions must be taken to ensure your safety and stability of system: ■ Conform to local occupational health and safety requirements when moving and lifting the equipment. ■ Ensure that mounting of the unit by mechanical loading tools should not induce hazardous conditions. ■ To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed on it.
Warning	**Chassis Warning** ■ Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. ■ To prevent personal injury or damage to the chassis, lift the unit only by using handles that are an integral part of the chassis, or by holding the chassis underneath its lower edge. ■ Any instructions in this guide that require opening the chassis or removing a board should be performed by qualified service personnel only. ■ Slots and openings in the chassis are provided for ventilation. Do not block them. Leave the back of the frame clear for air exhaust cooling and to allow room for cabling - a minimum of 6 inches (15.24 cm) of clearance is recommended.

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Mark	Notes
 Warning	**Electric Shock Warning** ■ This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power supply cords before servicing the unit. ■ Before working on a chassis or working near power supplies, unplug the power cord on AC units. ■ Do not work on the system or connect or disconnect cables during periods of lightning activity. ■ This unit is grounded through the power cord grounding conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product input or outputs. ■ Route power cords and other cables so that they are not likely to be damaged. Disconnect power input to unit before cleaning. Do not use liquid or aerosol cleaners; use only a damp cloth to clean chassis. ■ Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on. Do not insert anything into either of the system's two power supply cavities with power connected ■ Never install an AC power module and a DC power module in the same chassis. ■ Do not wear hand jewelry or watch when troubleshooting high current circuits, such as the power supplies. ■ To avoid fire hazard, use only the specified correct type voltage and current ratings as referenced in the appropriate parts list for this unit. Always refer fuse replacement to qualified service personnel. ■ This unit relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). ■ To avoid electrocution ensure that the rack has been correctly grounded before switching on the unit. When removing the unit remove the grounding connection only after the unit is switched off and unplugged.
 Caution	**Electrostatic Discharge (ESD) Caution** ■ Follow static precaution at all times when handling this unit. ■ Always wear an ESD-preventive wrist or ankle strap when handling electronic components. Connect one end of the strap to an ESD jack or an unpainted metal component on the system ■ Handle cards by the faceplates and edges only; avoid touching the printed circuit board and connector pins. ■ Place any removed component on an antistatic surface or in a static shielding bag. ■ Avoid contact between the cards and clothing. ■ Periodically check the resistance value of the antistatic strap. Recommended value is between 1 and 10 mega-ohms (Mohms).

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Mark	Notes
Warning	**Laser Radiation Warning** Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Never operate a unit with a broken fibre or with a separated fiber connector.
Warning	Lithium Battery Handling Safety Instructions ■ CALIFORNIA PERCHLORATE ADVISORY: Some lithium batteries may contain perchlorate material. The following advisory is provided: "Perchlorate Material - special handling may apply, see: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*".
Caution	■ Risk of explosion if battery is replaced incorrectly or with an incorrect type ■ Dispose of used batteries according to the manufacturer's instructions ■ There are no user-serviceable batteries inside Harmonic products. Refer to Harmonic qualified personnel only to service the replaceable batteries

Symboles de sécurité et traduits de sécurité, d'avertissement et Attention Instructions (français)

Pour éviter des blessures ou des dommages matériels, avant de commencer l'installation ou le remplacement du produit, lire, observer, et de respecter toutes les instructions et informations de sécurité suivantes. Produits harmoniques et / ou l'emballage du produit peuvent être marqués avec les symboles de sécurité utilisés dans le présent document, lorsque cela est nécessaire pour alerter les opérateurs, les utilisateurs et les fournisseurs de services de consignes de sécurité pertinentes dans les manuels.

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Mark	Notes
 Avertissement	**Installation ou remplacement de l'unité de produit Avertissement** ■ Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés. (voir AS / NZS 3260 article 1.2.14.3 du personnel de service). ■ Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation. ■ Lors de l'installation ou le remplacement de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier. ■ L'équipement doit être installé conformément aux normes électriques nationales et locales. ■ Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. ■ Utilisez uniquement des pièces de rechange spécifiées. ■ Ne pas utiliser ce produit dans l'eau ni à proximité de l'eau. Débrancher toutes les prises d'alimentation secteur avant d'installer des options ou d'effectuer l'entretien de l'unité, à moins d'instructions contraires dans le présent manuel.
 Avertissement	**Rack Monture Avertissement** Pour éviter les blessures corporelles lors du montage ou l'entretien de cet appareil dans un rack, des précautions particulières doivent être prises pour assurer votre sécurité et la stabilité du système: ■ Conformez-vous aux exigences de médecine du travail et de sécurité lorsque vous déplacez et soulevez le matériel. ■ Assurez-vous que le montage de l'appareil par des outils de chargement mécaniques ne doit pas induire des conditions dangereuses. ■ Pour éviter tout risque d'électrocution, le rack et chaque élément de l'équipement installé dans le rack doivent être correctement reliés à la terre.
 Avertissement	**Châssis Avertissement** ■ Avant de connecter ou de déconnecter les câbles d'alimentation (pôles et terre) du châssis, vérifiez que le circuit de courant continu est hors tension. ■ Pour éviter toute blessure ou des dommages au châssis, soulevez l'unité uniquement par les poignées du châssis lui-même ou en portant celui-ci par le bord inférieur. ■ Toutes les opérations du présent guide nécessitant l'ouverture du châssis ou le retrait d'une carte doivent être uniquement effectuées par du personnel d'entretien qualifié. ■ Le châssis est muni de fentes et d'ouvertures d'aération. Ne pas les bloquer. Dégager l'arrière du cadre pour permettre le refroidissement de l'évacuation d'air et laisser de la place au câblage; un dégagement d'au moins 15.24 cm (6 po) est recommandé.

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Mark	Notes
 Avertissement	**Choc électrique Avertissement** ■ Il est possible que cette unité soit munie de plusieurs cordons d'alimentation. Pour éviter les risques d'électrocution, débrancher les deux cordons d'alimentation avant de réparer l'unité. ■ Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif. ■ Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage. ■ Ce unité est mis à la terre par le conducteur de protection intégré au cordon d'alimentation. Pour éviter les chocs électriques, brancher le cordon d'alimentation dans une prise correctement cable avant de raccorder les entrées ou sorties du unité. ■ Installer les cordons d'alimentation et autres cables de sorte qu'ils ne risquent pas d'être endommagés. Couper l'alimentation avant nettoyage. Ne pas utilizer de nettoyant liquide ou en aérosol; utiliser seulement un linge humide. ■ Des courants électriques dangereux circulent dans cet appareil. Afin d'éviter les lessures, ne pas toucher les connexions et composants exposés lorsque l'appareil est sous tension. Ne rien insérer dans l'une ou l'autre des cavités des prises de courant du système lorsque l'appareil est sous tension. ■ N'installez jamais un module d'alimentation AC et un module d'alimentation DC dans le même châssis. ■ Ne pas porter de bijoux aux mains ni de montre durant le dépannage des circuits à haute tension, comme les transformateurs. ■ Pour prévenir les risques d'incendie, n'utiliser que le type, la tension et le courant nominal spécifiés dans la nomenclature des pièces de ce unité. Toujours confier le remplacement des fusibles à du personnel d'entretien qualifié. ■ Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge). ■ Pour éviter l'électrocution, assurez-vous que le rack a bien été mis à la terre avant de mettre l'unité en marche. Lors du retrait de l'unité, retirer le raccordement de terre seulement après avoir mis l'unité à l'arrêt et l'avoir débranchée.

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Mark	Notes
 Attention	**Les décharges électrostatiques (ESD) Attention** ■ Respecter systématiquement les precautions relatives aux charges électrostatiques durant la manipulation de cet unité. ■ Portez toujours un poignet ou la cheville bracelet antistatique préventive lors de la manipulation des composants électroniques. Branchez une extrémité de la sangle à une prise ESD ou d'un composant métallique non peinte sur le système. ■ Manipulez les cartes en les faces avant et les bords seulement; éviter de toucher la carte de circuit imprimé et les broches du connecteur. ■ Placer un composant retiré sur une surface antistatique ou dans un sac de protection statique. ■ Éviter tout contact entre les cartes et les vêtements. ■ Vérifier périodiquement la valeur de résistance de la sangle antistatique. Valeur recommandée est comprise entre 1 et 10 méga-ohms (Mohms).
 Avertissement	**Rayonnement laser Attention** ■ Rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou regarder directement avec des instruments optiques. Ne jamais faire fonctionner une unité en cas de bris d'une fibre ou de séparation d'un connecteur de fibre.
 Avertissement	**Batterie au lithium Manipulation instructions de sécurité** ■ Perchlorate pour la Californie Consultatif: Certaines batteries au lithium, peuvent contenir du perchlorate. le texte qui suit consultatif est prévu: "Présence de perchlorate - une manipulation spéciale peut s'appliquer, voir: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*".
 Attention	■ Il y a danger d'explosion si la batterie est remplacée de manière incorrecte ou par une batterie de type incorrect. ■ Mettre au rebut les batteries usagees conformement aux instructions du fabricant. ■ Les batteries des produits Harmonic ne peuvent pas être réparées ni entretenues par l'utilisateur. Ne confier l'entretien des batteries remplaçables qu'à du personnel compétent de Harmonic.

Sicherheit Symbole und übersetzt Sicherheit, Achtung & Vorsicht Anleitung (Deutsch)

Um Verletzungen oder Sachschäden zu vermeiden, bevor Sie mit der Installation oder Austausch des Produkts zu beginnen, zu lesen, zu beobachten, und sich an all den folgenden Sicherheitshinweise und Informationen. Harmonic Produkte und / oder Produktverpackungen können mit den Sicherheitssymbole in diesem Dokument verwendet werden, markiert, wenn es notwendig ist für die Betreiber, Anwender und Dienstleister, um relevante Sicherheitsanweisungen in den Handbüchern zu alarmieren.

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Mark	Notes
 Warnung	**Installation oder den Austausch des Produkts Einheit Warnung** ■ Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet warden (siehe AS / NZS 3260 Clause 1.2.14.3 Servicepersonal) ■ Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen. ■ Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden. ■ Die Installation der Geräte muss den Sicherheitsstandards entsprechen. ■ Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang. ■ Verwenden Sie nur die angegebenen Ersatzteile ■ Das Gerät in oder in der Nähe von Wasser verwenden. Trennen Sie vor der Installation von Optionen oder Wartung des Gerätes, es sei denn, dies wurde von diesem Handbuch alle Netz.
 Warnung	**Rack-Montage-Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt: ■ Entsprechen den lokalen Arbeitsschutzanforderungen beim Bewegen und Heben der Ausrüstung. ■ Stellen Sie sicher, dass die Montage des Gerätes durch mechanische Belastung Werkzeuge sollten nicht gefährlichen Bedingungen zu induzieren. ■ Um das Risiko von möglichen elektrischen Schlag zu vermeiden, muss mit einer angemessenen Erdung für Rack und jedes Gerät installiert ist implementiert werden.
 Warnung	**Chassis Warnung** ■ Gleichstrom-Unterbrechung Bevor Sie Erdungs- oder Stromkabel an das Chassis anschließen oder von ihm abtrennen, ist sicherzustellen, daß der Gleichstrom-Stromkreis unterbrochen ist. ■ Um Verletzungen und Beschädigung des Chassis zu vermeiden, sollten Sie das Chassis nicht an den Henkeln auf den Elementen (wie z.B. Stromanschlüsse, Kühlungen oder Karten) heben oder kippen; oder indem Sie es unterhalb der Unterkante packen. ■ Alle Hinweise in diesem Handbuch, die das Öffnen benötigen Sie das Gehäuse oder das Entfernen eines Board sollte nur von qualifiziertem Fachpersonal durchgeführt werden. ■ Für Schlitze und Öffnungen im Chassis vorgesehen. Blockieren Sie sie nicht. Lassen Sie die Rückseite des Rahmens frei für Abluftkühlung und um Platz für die Verkabelung ermöglichen - ein Minimum von 6 Zoll (15,24 cm) Abstand wird empfohlen

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Mark	Notes
 Warnung	**Elektroschock-Warnung** ■ Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten. ■ Vor der Arbeit an einem Chassis für Arbeiten in der Nähe Stromversorgung, ziehen Sie das Netzkabel mit Netzeinheiten. ■ Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert. ■ Dieses Gerät ist über das Netzkabel Erdungsleiter geerdet. Um einen Stromschlag zu vermeiden, stecken Sie das Netzkabel in eine Steckdose richtig verdrahtet, bevor Sie das Produkt Eingang oder Ausgänge. ■ Verlegen Sie Netzkabel und andere Kabel, so dass sie wahrscheinlich nicht beschädigt werden. Trennen Eingangsleistung Einheit vor der Reinigung. Verwenden Sie keine flüssigen oder Aerosolreiniger; nur mit einem feuchten Tuch zu reinigen Chassis. ■ Gefährliche Spannungen vorhanden sind an mehreren Stellen in diesem Produkt. Um Verletzungen zu vermeiden, berühren Sie nicht freiliegenden Anschlüsse und Komponenten während schaltet ist. Sie keine Gegenstände in einem der beiden Stromversorgungs Hohlräume des Systems mit Strom verbunden einführen. ■ Ein Wechelstromsmodul und ein Gleichstrommodul dürfen niemals in demselben Chassis installiert werden. ■ Tragen Sie keine Hand Schmuck oder schauen Sie bei der Fehlersuche hohen Stromkreise, wie beispielsweise die Stromversorgung. ■ Um die Brandgefahr zu vermeiden, verwenden Sie nur den genannten richtige Art von Spannung und Strom Ratings als in der entsprechenden Stückliste für diese Einheit verwiesen. Beziehen sich immer auf Austausch der Sicherung von qualifiziertem Fachpersonal. ■ Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird. ■ Um einen Stromschlag zu vermeiden, sicherzustellen, dass die Zahnstange wurde korrekt vor dem Einschalten des Gerätes geerdet. Beim Entfernen der Einheit entfernen Sie die Masseverbindung nur, nachdem das Gerät ausgeschaltet und der Netzstecker gezogen.

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Mark	Notes
Vorsich	**Elektrostatische Entladung (ESD) Vorsicht** ■ Folgen Sie statische vorsorglich zu jeder Zeit beim Umgang mit diesem Gerät. ■ Tragen Sie immer einen ESD-präventive Handgelenk oder Knöchel-Riemen beim Umgang mit elektronischen Komponenten. Schließen Sie ein Ende des Bandes an einem ESD-Buchse oder ein unlackiertes Metallteil auf dem System. ■ Hand Karten nur durch die Faceplates und Kanten; Berühren Sie die bedruckte Leiterplatte und Steckerstifte. ■ Legen Sie alle entfernten Komponenten auf eine antistatische Oberfläche oder in einem Statik-Beutel. ■ Kontakt zwischen den Karten und Kleidung vermeiden. ■ Den Widerstandswert der gegen statische Gurt in regelmäßigen Abständen überprüfen. Empfohlener Wert ist zwischen 1 und 10 Mega-Ohm (MOhm).
Warnung	**Laserstrahlungen Warnung.** Unsichtbare Laserstrahlung kann von getrennten Fasern oder Stecker emittiert werden. Nicht in die Strahlen blicken oder direkt mit optischen Instrumenten. Niemals ein Gerät mit einem gebrochenen Faser oder mit einem Glasfaseranschluss getrennt.
Warnung	**Lithium-Batterie Handhabung Sicherheitshinweise** CALIFORNIA PERCHLORATE ADVISORY: Einige Lithium-Batterien kann Perchlorat enthalten. Die folgende Beratungs gesetzt: "Perchlorat - Sonderbehandlung kann erforderlich sein, finden Sie unter: *www.dtsc.ca.gov/ hazardous waste/perchlorate/ for information*".
Vorsich	■ Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr ■ Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers. ■ Es gibt keine zu wartenden Akkus im Harmonic Produkte. Siehe Harmonic qualifiziertes Personal, um die austauschbare Batterien Service

Site Preparation Instructions

NOTE: Only trained and qualified service personnel (as defined in IEC 60950 and AS/NZS 3260) should install, replace, or service the equipment. Install the system in accordance with the U.S. National Electric Code if you are in the United States.

1. Preparing & Choosing a Site for Installation
   - ❑ To ensure normal system operation, plan your site configuration and prepare the site before installation.
   - ❑ Install the unit in a restricted access area.

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- Choose a site with a dry, clean, well-ventilated and air-conditioned area.
- Choose a site that maintains an ambient temperature of 32 to 104°F (0 to 40°C)

2. Creating a Safe Environment
   - Connect AC-powered systems to grounded power outlets or as per local regulations.
   - Do not move or ship equipment unless it is correctly packed in its original wrapping and shipping containers.
   - Only allow Harmonic trained personnel to undertake equipment service and maintenance. Do not permit unqualified personnel to operate the unit.
   - Wear ear protection when working near an NSG Pro platform for a longer period of time.
3. Rack Mounting the Unit
   - Install the system in an open rack whenever possible. If installation in an enclosed rack is unavoidable, ensure that the rack has adequate ventilation.
   - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips). This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
   - When mounting this unit in the partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
   - If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
   - The rack must be anchored to an immovable support to prevent it from tipping when the unit is mounted on it. The rack must be installed accoring to the rack maufacturer's instructions.
   - Disconnect all power and external cables before lifting the unit. Depending on the weight of the unit, more than one person might be required to lift it.
4. Power Considerations
   a. AC Power
      - Adding to the system a UPS (Uninterrupted Power Supply) and an AVR (Automated Voltage Regulator) is highly recommended.
      - Installing the main power supply by a qualified electrician, according to power authority regulations. Make sure all powering are wired with an earth leakage, according to local regulations.
      - It is recommended to install the encoder within 1.5m (approximately 5 feet) from an easily accessible grounded AC outlet.
      - When the encoder is rack-mounted, ensure that the rack is correctly grounded.
   b. DC Power
      - Ensure a suitable overcurrent device is in-line between the equipment and the power source.
      - Connect DC-input power supplies only to a DC power source that complies with the safety extra-low voltage (SELV) requirements in the UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, AS/NZS 60950-1, EN/IEC 60825-1, 21 CFR 1040, EN 60950-1, and IEC 60950-1 standards.
      - Ensure that power is removed from the DC circuit before installing or removing power supplies
5. Handling Fiber Channel Cables
   - Always read and comply with the handling instructions on the shipping container.
   - Follow all ESD precautions and approved fiber cleaning procedures.

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- The fiber is made of a very pure, expensive glass and should be treated with great care. Handle fibers only in areas that are very clean and do not contain sharp objects.
- Wear finger cots or gloves as dirt and oils can damage the fiber and contaminate connectors.
- Do not allow kinks or knots to develop in the fiber. If tangles occur, carefully work out the tangles avoiding pulling or bending the fibre beyond its bend radius.
- Always use the correct tools for stripping and cleaving the fiber. It will save time and reduce breakage caused by scratches.
- If you must secure a bundle of fiber cables together, avoid plastic and metal tie wraps; secure with velcro instead.

6. Disposing of the Unit
   - Dispose of the unit and its components (including batteries) as specified by all national laws and regulations.

Product End-of-Life Disassembly Instructions

For disassembly instructions, please call the technical support in order to remove components requiring selective treatment, as defined by the EU WEEE Directive (2012/19/EU). See Contacting the *Technical Assistance Center.*

Product Disassembly Process

1. Disassemble equipment at a dedicated area only, gather the needed tools for disassembly.
2. Remove covers, housing, etc.
3. Remove and separate sub-assemblies (i.e. cables, metals, displays, fans, etc.).
4. Separate hazardous materials from the remainder of the material.
   a. Sort hazardous materials into their different types (i.e., batteries, hazardous liquids, hazardous solids, fiberglass, etc.).
   b. Proceed with hazardous waste management processes only.
5. Identify re-usable materials/sub-assemblies and separate these from the rest of the material.
6. Identify and separate recyclable materials as per below examples:
   a. Scrap material to be sent to smelter(s).
   b. E-waste such as displays, CPU's, cables and wires, hard drives, keyboards, etc.
   c. Metals such as steel, brass, and aluminum.
   d. Plastics such as fan casings, housings, covers, etc.
   e. Fiber optics and plastic tubing not containing electrical or data wiring.

Safety Rules (English)

Recycler personnel are to wear personal protective equipment including proper eye protection, proper hand protection, and proper breathing protection if needed.

Recycler personnel shall be experienced with using the proper tools required for disassembling equipment. Untrained personnel shall not disassemble Harmonic products. Unfamiliarity with tools can cause damage and injury.

Règles de sécurité (French)

Le personnel du recycleur doit porter de l'équipement de protection individuelle, y compris des lunettes, des gants et un masque de protection appropriés au besoin.

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Le personnel du recycleur doit avoir de l'expérience des outils de démontage de l'appareil. Les produits Harmonic ne doivent pas être démontés par du personnel non qualifié. Une mauvaise connaissance des outils peut causer des dommages et des blessures.

EU Manufacturer's Declaration of Conformity

This equipment is in compliance with the essential requirements and other provisions of Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC.

NOTE: For specifics, about which standards have been applied, refer to the Declaration of Conformity of the product on Harmonic website at *Product Regulatory Compliance* or contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com*

Electromagnetic Compatibility Notices – Class A

a. FCC Verification Statement (USA)

   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

   This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

   Connections between the Harmonic equipment and other equipment must be made in a manner that is consistent with maintaining compliance with FCC radio frequency emission limits. Modifications to this equipment not expressly approved by Harmonic may void the authority granted to the user by the FCC to operate this equipment and you may be required to correct any interference to radio or television communications at your own expense.

b. ICES–003 Statement (Canada)

   English: This Class A digital apparatus complies with Canadian ICES-003.

   French: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

c. CE Declaration of Conformity (European Union)

   This product has been tested in accordance too, and complies with the Low Voltage Directive (2014/30/EU) and EMC Directive (2014/35/EU). The product has been marked with the CE Mark to illustrate its compliance.

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d. VCCI Class A Warning (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of the notice above:

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) from Information Technology Equipment. If this equipment is used in a domestic environment, it may cause radio interference. When such trouble occurs, the user may be required to take corrective actions.

e. BSMI EMC Notice (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策

English translation of the notice above:

This is a Class A Information Product, when used in residential environment, it may cause radio frequency interference, under such circumstances, the user may be requested to take appropriate counter measures.

f. Class A Warning (Korea)

주의 A급 기기 이 기기는 업무용으로 전자파 적합 등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

English translation of the notice above:

This is a Class A device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this was sold or purchased by mistake, it should be replaced with a residential-use type.

g. Class A Statement (China)

中华人民共和国“A类”警告声明

声 明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of the notice above:

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When labeled with the CCC marking, the product meets the applicable safety and EMC requirements for China. This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

h. Class A Warning – CISPR 22 (AS/NZS)

Warning (English)

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Attention (French)

Il s'agit d'un produit de classe A. Dans un environnement local, ce produit peut entraîner des perturbations radioélectriques, auquel cas l'utilisateur devra éventuellement prendre des mesures adéquates.

Product Regulatory Compliance

Harmonic products are typically tested to the latest safety and electromagnetic compatibility (EMC) specifications and test methods, and are marked with one or more of the following regulatory/certification markings. Some of the certification markings will vary depending on what certifier was used to obtain a certification.

Please visit Harmonic *Product Regulatory Compliance* page to view information on applied safety & EMC standards and regulatory marks on Harmonic products. You can also email us at *regulatory.compliance@harmonicinc.com* for assistance on regulatory compliance for Harmonic products.

Product Regulatory Compliance Markings

Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
USA/ Canada	EN 60950-1:2006+A11:2009+A1:2010+A12:2011; CAN/CSA C22.2 No. 60950-1-07+A1:2011/UL 60950-1:2011	Safety	NRTL (National Recognized Test Laboratory)	c UL us LISTED or TÜVRheinland c us
USA/ Canada	FCC CFR 47 Part 15, Class A ICES-003: Issue 5, 2012; Class A	EMC	FCC Class A Statement	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
European Union	RoHS: EN 50581:2012; EN55022:2010/ CISPR 22:2008; EN55024:2010/ CISPR 24:2010; EN61000-3-2:2006+A1:2009+A2:2009; EN61000-3-3:2008; Class A	Safety and EMC	CE / Low Voltage Directive	CE
Germany	EN 60950-1; EN60825-1 (for laser)	Safety	GS	TÜVRheinland CERTIFIED GS geprüfte Sicherheit
Mexico	NOM-019-SCFI-1998	Safety	NOM	NOM
Taiwan	CNS 14336-1:2010 CNS 13438:2006; Class A	Safety and EMC	BSMI Certification (RPC) Number & Class A Warning	R3A001 警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。
Japan	VCCI V-3/2013.04; CISPR 22:2008, Class A	EMC	VCCI	VCCI
Australia and New Zealand	AS/NZS CISPR22:2009+A1:2010; Class A	Safety	C-Tick	NXXXXX
Korea	KN22 Class A and KN 24	EMC	KC	KC

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Table B–1:Regulatory Compliance Markings

Country/ Region	Testing Standard/ Specification	Certification Type	Regulatory Mark Name	Product Marketing
China	GB4943.1-2011 GB9254-2008 GB17625.1-2012	Safety and EMC	CCC	
India	IS 13252 (Part 1): 2010	Safety	BIS Compulsory Registration	"Self Declaration - Conforming to IS 13252 (Part 1):2010, R-XXXXXXXX"

Product Environmental Compliance

Harmonic manufactures high quality and innovative IT and telecommunications equipment, video delivery infrastructure solutions and services for its customers worldwide. Harmonic is committed to providing our customers with safe and environmentally friendly products that are compliant with all relevant regulations, customer specifications, and environmental legislation, including the directives described below.

EU RoHS

In July 2006, the European Union's (EU) Directive (2002/95/EC) on the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) went into effect, and in July, 2011, the European Union's RoHS Recast Directive (2011/65/EU) also known as RoHS II entered into force.

Harmonic understands the environmental risks associated with the substances covered by the RoHS Directive and has committed to eliminating or reducing the use of these, as well as other environmentally sensitive substances in our products. Harmonic also continues to comply with the requirements under RoHS II.

For more information, please visit EU RoHS directive page at official EU website.

http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm

Restricted Substance Statement

Harmonic products contain less than the permitted limits for the six restricted substances except where exemptions published in the RoHS2 Directive are applicable. This statement is based on vendor-supplied analysis or material certifications, and/or lab test results of the component raw materials used in the manufacture of Harmonic products.

Table B–2:Restricted Substances

Restricted Substance	Permitted Limit*
Cadmium (Cd)	≤0.01%
Lead (Pb)	≤0.1%
Chromium (VI) (Cr (VI))	≤0.1%
Mercury (Hg)	≤0.1%

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Table B–2:Restricted Substances

Restricted Substance	Permitted Limit*
Polybrominated biphenyls (PBBs)	≤0.1%
Polybrominated diphenyl ether (PBDE)	≤0.1%
*Homogeneous material definition as per the EU Directive.	

EU REACH

REACH (Registration, Evaluation, Authorization and restriction of Chemicals) (EC 1907/2006) is a European Union's regulation on chemicals and their safe use which came into force in June, 2007.

Harmonic supports the basic aim of REACH in improving the protection of human health and environment through the better and earlier identification of intrinsic properties of chemical substances. Harmonic products are considered "articles" under REACH; therefore, we are required to provide recipients of our products with information on Substance of Very High Concern (SVHC) present in concentration above 0.1% (w/w).

Substances in our products are not intended to be released under normal or reasonably foreseeable conditions of use; therefore, the registration requirement in REACH Article 7(1) does not apply to our products.

For more information, please visit REACH regulation page at official EU website.

http://ec.europa.eu/environment/chemicals/reach/reach_en.htm

China RoHS

China's regulation on restriction of the use of certain hazardous substances commonly (China RoHS), is applicable to all Electronic and Information Products (EIPs) and parts sold in China after March 01, 2007. China RoHS regulation restricts the use of the same six substances as the European Union's ROHS, but has requirements for product labeling and regulated substance information disclosure.

Harmonic complies with China RoHS Phase I for labeling and information disclosure requirements and continues to monitor new developments in China RoHS Phase II towards substance restriction and certification program.

For more information, please visit China RoHS regulation page at official US export website.

http://www.export.gov/china/doingbizinchina/

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China RoHS Disclosure Report

Below table shows the presence of hazardous substances, or elements in Harmonic products, if the part is present.

该表显示哈雷公司产品中可能含有的有毒有害物质元配件的信息，除了来源于元配件供应商的物料成分资料， 亦来自其它相关的机构与资料。哈雷产品不一定使用这些元配件。

This table shows those components where hazardous substances may be found in Harmonic products based on, among other things, material content information provided by third party suppliers. These components may or may not be part of the product.

除非特殊注明，哈雷公司产品的环保使用期限 均为 20 年。该环保使用期限的有效条件为：必须遵循该产品使用手 册的规定，对该产品进行使用或存储。

The Environmental Protective Use Period for Harmonic products is 20 years unless displayed otherwise on the product. The EPUP period is valid only when the products are operated or stored as per the conditions specified in the product manual.

部件名称 (Part name)	有毒有害物质或元素 (Hazardous Substance)					
	铅	汞 (Hg)	镉 (Cd)	六价铬 (CrVI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (Printed Circuit Assemblies)	X	O	O	O	O	O
机械组件 (Mechanical Subassemblies)	X	O	O	O	O	O
光学组件 (Optical Subassemblies)	X	O	O	O	O	O
电源 (Power Supplies)	X	O	O	O	O	O
缆线 / 线束 (Cables, harnesses)	X	O	O	O	O	O
屏幕 / 显示器 (Screens, Monitors)	X	O	O	O	O	O
金属零件 (Metal Parts)	X	O	O	O	O	O
塑料 / 发泡材料 (Plastics, foams)	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O

O: 表示在该部件的所有均质材料中，此类有毒有害物质的含量均小于 SJ/T11363-2006 标准所规定的限量。

O: Indicates the content of the toxic and hazardous substances at the homogeneous material level of the parts is below the limit defined in SJ/T11363 2006 standard.

X: 表示至少在该部件的某一均质材料中，此类有毒有害物质的含量超出 SJ/T11363-2006 标准规定的限量。

X: Indicates that the content of the toxic and hazardous substances in at least one of the homogeneous materials of the parts is above the limit defined in SJ/T11363 2006 standard.

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Other RoHS and REACH type Regulations

Harmonic will comply with RoHS and REACH type regulations evolving in other countries, if they become relevant to our products or in markets where we sell our products.

Waste Electrical and Electronic Equipment (WEEE)

European Parliament and the Council of the European Union's WEEE Directive (2002/96/EC) came into force on August, 2005 and, were more recently amended in July, 2012. This directive encourages the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Harmonic ensures that all requirements for registration, reporting, design and data tracking are complied with to meet the objectives of the WEEE directive.

For more information, please visit WEEE directive page at official EU website.

http://ec.europa.eu/environment/waste/weee/legis_en.htm

Battery Directive

In September 2006, the European Union's Directive 2006/66/EC (Battery Directive) came into force with an aim to prohibit the sale of batteries and accumulators containing hazardous substances and to set rules and promote collection, treatment, recycling and disposal of waste batteries and accumulators. This directive applies to spent batteries collected together with WEEE and requires their removal and separate collection. Once removed from WEEE, spent batteries are governed by the Battery Directive. Harmonic uses lithium batteries in its products and our responsibility under the Battery Directive is taken care of under our WEEE Take-Back program.

For more information, please visit Batteries and Accumulators directive page at official EU website.

http://ec.europa.eu/environment/waste/batteries/

Harmonic is committed to manufacturing environmentally safe products for the community, and will make reasonable efforts and required adjustments to its practices, if necessary, to comply with various environmental directives and industry initiatives on the elimination of hazardous substances, labeling, marking, certification and registration as required in markets where we sell our products.

Download Harmonic's Environmental Compliance Statement at the following location:

http://www.harmonicinc.com/sites/default/filesEnvironmental%20Compliance%20Statement.pdf

WEEE Take-Back Request Program

In order to assist EU member states to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally, Harmonic strives to recycle in compliance with the WEEE Directive any of its products that cannot be re-used.

Harmonic's customers should:

- Not discard equipment in household or office garbage
- Arrange proper recycling of unneeded equipment. For the take-back of Harmonic equipment, customers must:
  - Collect the information required to complete Harmonic's WEEE Take-Back Request form

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- Complete and submit the online WEEE Take-Back Request form. Please note that forms must be fully completed in order to prevent process delays
- Receive instant online confirmation indicating the reference number
- Receive the End of Life (EOL) asset return authorization number and instruction for EOL asset return

- Not ship EOL product to Harmonic without a Harmonic-provided EOL asset return authorization number

The crossed-out wheeled bin symbol on a Harmonic-branded commercial product indicates that the product should not be disposed of along with municipal waste, but invites our customers to return the product to us under Harmonic's WEEE Take-Back program for product disposal.

Harmonic will pay for the cost of shipping and will provide a Certificate of Recycling or a Certificate of Destruction upon request. For more information on collection, reuse and recycling or to initiate the WEEE take-back process, please complete the form at *http://www.harmonicinc.com/webform/weee-takeback-request* or contact *Harmonic Technical Assistance Center (TAC) or email RMA team at rma.emea@harmonicinc.com.*

Compliance with additional country specific environmental, safety, and EMC standards

In addition to above listed standards and compliance regulations, Harmonic products may also be compliant with other country specific environmental, safety and EMC requirements. Please contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com* or your local sales representative for more information about compliance with particular country or standard.

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Appendix C
Standard ES Types and Descriptors

Standard Elementary Stream (ES) Types

The following standards are used to define types of elementary stream:

Value	Description
0x0	ITU-T | ISO/IEC Reserved
0x1	ISO/IEC 11172 Video
0x2	ITU-T Rec. H.262 | ISO/IEC 13818-2 Video or ISO/IEC 11172-2 constrained parameter video stream
0x3	ISO/IEC 11172 Audio
0x4	ISO/IEC 13818-3 Audio
0x5	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 private_sections
0x6	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets containing private data
0x7	ISO/IEC 13522 MHEG
0x8	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Annex A DSM CC
0x9	ITU-T Rec. H.222.1
0xA	ISO/IEC 13818-6 type A
0xB	ISO/IEC 13818-6 type B
0xC	ISO/IEC 13818-6 type C
0xD	ISO/IEC 13818-6 type D
0xE	ISO/IEC 13818-1 auxiliary
0xF-0x7F	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Reserved
0x80 - 0xFF	User Private

Standard ES and Program Descriptors (MPEG)

The following MPEG standards are used to extend the definitions of elementary stream and programs:

Value	Description
0x2	Video stream descriptor

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Value	Description
0x3	audio stream descriptor
0x4	hierarchy descriptor
0x5	registration descriptor
0x6	data stream alignment descriptor
0x7	target background grid descriptor
0x8	video window descriptor
0x9	CA descriptor
0xA	ISO 639 descriptor
0xB	system clock descriptor
0xC	multiplex buffer utilization descriptor
0xD	copyright descriptor
0xF	private data indicator descriptor
0x10	smoothing buffer descriptor
0x12	IBP descriptor

Standard ES and Program Descriptors (DVB)

The following DVB standards are used to extend the definitions of elementary stream and programs:

Value	Description
0x51	Mosaic descriptor
0x52	Stream identifier descriptor
0x56	Teletext descriptor
0x59	Subtitling descriptor
0x5F	Private data specifier
0x60	Service move descriptor
0x65	CA system descriptor
0x66	Data broadcast ID descriptor

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Appendix D
Loader Utility

The Loader utility is a powerful tool for saving the ProStream configuration and for uploading it to your device or any other ProStream unit when required. Downloading and uploading the configuration enables the following:

- backup configuration
- To upload the configuration to another device
- To upload various settings to the device.

The Loader utility is provided with the ProStream and can be downloaded to your PC.

Following is a short description and instructions on how to operate the Loader utility once you have downloaded it to your PC. For further information about downloading the application, see *To download the Loader utility:*

Using the Loader Utility

The following sections guide you on how to use the Loader utility.

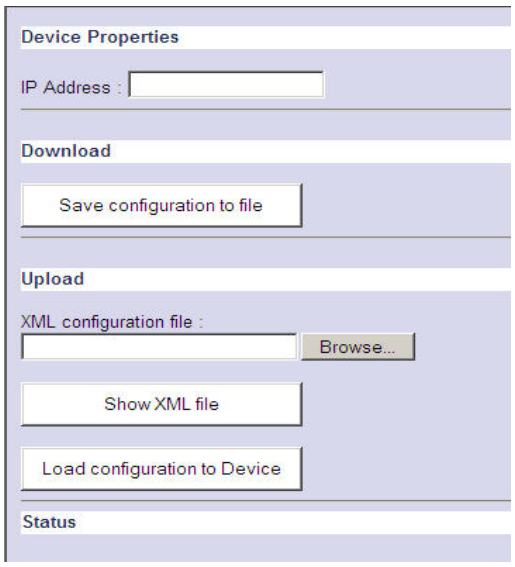
Starting the Loader Utility

Once you downloaded the Loader utility, start it when required.

To start the Loader utility:

1. Navigate to the location of the Loader utility and double click the CfgLoader.htm file.

   Your browser opens and displays the Loader page:



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Loader Utility Page

The Loader utility page comprises the following sections:

- Device Properties - Displays the IP address of ProStream unit with the required configuration
- Download - Allows you to download the configuration from the device to your computer
- Upload - Allows you to clear previous configuration form the device and to upload the saved configuration
- Status - Displays the status of the current operation

Downloading Configuration

When downloading the ProStream configuration the Loader utility saves it as an.XML file. The .XML file includes all the configuration beside the IP address, Subnet mask and default gateway of ETH1 port.

To download a configuration:

1. In Loader utility, click **Save Configuration to File**.

   A standard Save as window appears.
2. Navigate to the location of your choice and click **Save**.

   Once downloading is complete, a message appears in the Status section of the Loader page notifying you that the downloading is complete. An .XML file with the configuration appears in the location of your choice.

Uploading Configuration

When uploading a configuration, the Loader utility uploads the required configuration to the device and the previous configuration is removed.

To upload a configuration

1. Click **Browse** in the Loader utility page to locate the required configuration.
2. Browse to the configuration file of your choice and click **Open**.
3. To view the file, click **Show .XML File**.
4. To upload, click **Load Configuration to Device**.

The previous configuration is removed and the new one is uploaded. The Status section notifies you when the uploading is complete. You may use the ProStream with the new configuration.

NOTE: The uploaded configuration does not include the IP address, Subnet Mask, or default gateway of ETH1.

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